



Global Environment Facility



Bosnia and Herzegovina  
Ministry of Foreign Trade and Economic Relations



United Nations Industrial  
Development Organization



# NATIONAL IMPLEMENTATION PLAN FOR THE STOCKHOLM CONVENTION IN BOSNIA AND HERZEGOVINA

July 2015

Enabling Activities to Facilitate Early Action on the Implementation  
of the Stockholm Convention on Persistent Organic Pollutants (POPs)  
in Bosnia and Herzegovina





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# List of Abbreviations

AFFF	Aqueous Film-Forming Foam
APOPSBAL	Project „Assessment of the selected POPs (PCBs, PCDDs/Fs, OCPs) in the atmosphere and water ecosystems from the waste materials generated by warfare in former Yugoslavia“
BAT	Best Available Techniques
BD	Brcko District of Bosnia and Herzegovina
BEP	Best Environmental Practice
BHAS	Agency for Statistics of Bosnia and Herzegovina
BiH	Bosnia and Herzegovina
CAS	Chemical Abstracts Service
CBBiH	Central Bank of Bosnia and Herzegovina
CDD	Chlorinated dibenzo-p-dioxins
CDF	Chlorinated dibenzofurans
COP	Conference of Parties
CPRAC	Cleaner Production Regional Activity Centre
CRT	Cathode Ray Tube
DAFWM	Department for Agriculture, Forestry and Water Management of the Brcko District Government
DDD	Dichlorodiphenyldichloroethane
DDE	Dichlorodiphenyldichloroethylene
DDT	Dichlorodiphenyltrichloroethane
DSPPA	Department for Spatial Planning and Property Affairs of the Brcko District Government
DHOS	Department of Health and Other Services of the Brcko District Government
EC	European Community
EEA	European Environment Agency
EEE	Electrical and Electronic Equipment
EF	Environmental Fund of the Federation of Bosnia and Herzegovina
EFSA	European Food Safety Authority
EIA	Environmental Impact Assessment
ELV	End-of-life Vehicles
EP BiH	Elektroprivreda Bosne i Hercegovine (Public Enterprise Electric Utility of Bosnia and Herzegovina)
EP HZHB	Elektroprivreda Hrvatske Zajednice Herceg Bosne (Public Enterprise Electric Utility of Hrvatska Zajednica Herceg Bosna)
EPEE	Environmental Protection and Energy Efficiency Fund of Republika Srpska
EU	European Union
FAI	Federal Administration for Inspection Issues
FBiH	Federation of Bosnia and Herzegovina
FMAWMF	Federal Ministry of Agriculture, Water Management and Forestry
FMEMI	Federal Ministry of Energy, Mining and Industry
FMET	Federal Ministry of Environment and Tourism
FMH	Federal Ministry of Health
FMLSP	Federal Ministry Labour and Social Policy
GDP	Gross Domestic Product
GEF	Global Environment Facility

# List of Abbreviations

GHS	Globally Harmonized System of Classification and Labelling of Chemicals
HBB	Hexabromobiphenyl
HCB	Hexacklorobenzene
HCH	Hexachlorocyclohexane
HPP	Hydro Power Plant
HS	Harmonized Commodity Description and Coding System (Harmonized System)
ILO	International Labour Organization
IDDEEA	Agency for Identification Documents, Registers and Data Exchange of Bosnia and Herzegovina
ICT	Information and Communications Technology
ISO	International Organization for Standardization
IT	Information Technology
IUPAC	International Union of Pure and Applied Chemistry
ITA	Indirect Taxation Authority
LCD	Liquid-crystal display
LOD	Limit of detection
MAFWM	Ministry of Agriculture, Forestry and Water Management of Republika Srpska
MCA	Ministry of Civil Affairs of Bosnia and Herzegovina
MEDPOL	Mediterranean Pollution Assessment and Control Programme
MIEM	Ministry of Industry, Energy and Mining of Republika Srpska
MLWVDPP	Ministry of Labour, War Veterans and Disabled Persons Protection of Republika Srpska
MPPCEE	Ministry of Physical Planning, Civil Engineering and Ecology of Republika Srpska
MRL	Maximum Residue Levels
MoFTER	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
MHSW	Ministry of Health and Social Welfare of Republika Srpska
NACE Rev. 2	Statistical Classification of Economic Activities in the European Community, Rev. 2 (2008)
NATO	North Atlantic Treaty Organization
NEA	National Executive Agency
NIVA	Norwegian Institute for Water Research (Norsk Institutt for Vannforskning)
NFP	National Focal Point
NGO	Non-governmental organization
NIP	National Implementation Plan
PAH	Polycyclic Aromatic Hydrocarbons
PBB	Polybrominated biphenyls
PBDE	Polybrominated diphenyl ethers
PCB	Polychlorinated biphenyls
PCDD	Polycklorinated dibenzo-p-dioxins
PCDF	Polycklorinated dibenzofurans
PCT	Polychlorinated terphenyls
PCN	Polychlorinated naphthalene
PHPA	Plant Health Protection Administration of Bosnia and Herzegovina



# List of Abbreviations

PHPP	Pumping Hydro Power Plant
PFOS	Perfluorooctane sulfonate
PFOSF	Perfluorooctanesulfonyl fluoride
POPs	Persistent Organic Pollutants
PPA	Phyto-Pharmaceutical Agents
PRTR	Pollutant Release and Transfer Register
PUR	Polyurethane
REC	Regional Environment Centre
RECETOX	Research Centre for Toxic Compounds in the Environment
RS	Republika Srpska
RAIA	Republic Administration for Inspection Affairs of Republika Srpska
SFRY	Socialist Federal Republic of Yugoslavia
SPMD	Semipermeable Membrane Device
TCDD	2,3,7,8-Tetrachlorodibenzo-p-dioxin
TEQ	Toxic Equivalent
TPP	Thermal Power Plant
TS	Transformer Station
UN	United Nations
UNECE	United Nations Economic Commission for Europe
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
USA	United States of America
US EPA	United States Environmental Protection Agency
WB	World Bank
WEEE	Waste from Electrical and Electronic Equipment
WFD	Water Framework Directive
WHO	World Health Organisation

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# List of value units

Value	Prefix	Mark
$10^{12}$	tera	T
$10^9$	giga	G
$10^6$	mega	M
$10^3$	kilo	k
$10^2$	hecto	h
10	deka	da
$10^{-1}$	deci	d
$10^{-2}$	centi	c
$10^{-3}$	mili	m
$10^{-6}$	micro	$\mu$
$10^{-9}$	nano	n
$10^{-12}$	pico	p
$10^{-15}$	femto	f

Note: In this report decimal point separates the whole numbers from decimals, and decimal comma separates the thousands.

## Currency ratio:

1 BAM = 0.51EUR

1 EUR = 1.96 BAM



## EXECUTIVE SUMMARY



## Introduction

The Project “Enabling Activities to Facilitate Early Action on the Implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) in Bosnia and Herzegovina” (“the Project”) is funded by the Global Environment Facility (GEF) and implemented by the United Nations Industrial Development Organization (UNIDO) in collaboration with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MoFTER). The respective institutions from the Federation of Bosnia and Herzegovina (FBiH), Republika Srpska (RS) and Brcko District of Bosnia and Herzegovina (BD) are involved in the Project implementation.

The general objective of the Project is to strengthen the capacity of Bosnia and Herzegovina (BiH) to manage persistent organic pollutant substances (POPs), develop the National Implementation Plan (NIP) for the Stockholm Convention and help BiH in developing and submitting the NIP to the Secretariat of the Convention.

Key participants in the Project are the Ministry of Foreign Trade and Economic Relations of BiH, which is the focal point on behalf of BiH for coordination of cooperation with international structures and organs of the Stockholm Convention, the National Executive Agency (NEA) which consists of the consortium of Enova Ltd. Sarajevo and the Institute of Protection and Ecology of Republika Srpska, Banja Luka, and is responsible for the project realization, and the POPs National Sub-Committee (PNSC) whose responsibility is to oversee the implementation of the Project, and has an advisory role.

## Objectives and provisions of the Stockholm Convention

The Stockholm Convention on POPs was adopted on 22 May 2001, and entered into force on 17 May 2004, after 50 countries had ratified it. BiH ratified the Stockholm Convention on 30 May 2010 and committed to meeting the requirements of the Convention. The main objective of the Convention is to take measures for the elimination or restriction or prevention of the production, import, export and use of all manufactured POPs and the continuous reduction to minimize the occurrence of these pollutants in the environment, and the elimination of emissions of unintentionally produced POPs. The Convention regulates a total of 22 chemicals (pesticides and industrial chemicals) and unintentionally produced chemicals through industrial processes.

The main objective of the Convention is to take measures for the elimination or restriction or prevention of the production, import, export and use of all manufactured POPs and the continuous reduction to minimize the occurrence of these pollutants in the environment, and the elimination of emissions of unintentionally produced POPs.

Pursuant to Article 7 of the Stockholm Convention, each Party shall, within two years from the date of entry into force of the Convention, draft a plan for the implementation of its obligations under this Convention (National Implementation Plan - NIP).

National Implementation Plan for the Stockholm Convention in BiH is developed in accordance with “*Guidance for developing a national implementation plan for the Stockholm Convention on POPs*” (SSC, UNEP, UNIDO, UNITAR, 2012).

For the purpose of the Project implementation, the National Executive Agency in cooperation with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina has established six inventory groups and has assigned their tasks according to the TOR:

- POPs Pesticides Inventory Group
- Polychlorinated biphenyls inventory group (PCB Inventory Group)
- Polybrominated diphenyl ether (PBDEs) and perfluorooctanesulfonate (PFOS) inventory group (PBDEs/ PFOS Inventory Group)
- Inventory group for emissions from the unintentional production of polychlorinated dibenzodioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), hexachlorobenzene (HCB) and PCBs (PCDD/PCDF Inventory Group)
- Environment, Health, Research and Development Group
- POPs legislation and socio-economic development group (POPs Legislation Group).

The process of developing the NIP is described in detail in Chapter 1.2.

## Current POPs management in Bosnia and Herzegovina

The current POPs management in BiH is based on preliminary inventory of POPs which was prepared by the six POPs inventory task teams.

### **Preliminary inventory of POPs pesticides - Annex A, Part I of the Stockholm Convention**

Preliminary inventory of POPs pesticides, prepared by the POPs Pesticides Inventory Group, showed that POPs pesticides have never been produced in BiH. The import and use of most POPs pesticides (DDT, hexachlorobenzene, chlordane, heptachlor, aldrin, dieldrin, endrin, toxaphene) were banned in the early seventies of the twentieth century in line with legislation of the ex SFRY. Mirex was never permitted for trade in BiH. Pesticides containing active substances lindane and endosulfan have been banned since 1 October, 2008.

The use of DDT pesticides was discontinued in agriculture in the period from 1971 to 1973, whereas in public health and forestry it was used until 1989. DDT pesticides were not produced on the territory of BiH, nor were they imported, exported and used after 1989. Furthermore, the existence of stockpiles and wastes of DDT has not been confirmed during the preliminary inventory.

According to data provided by the Agency for Statistics of BiH, in the period from 2008 to 2013, a certain amount of goods (5.722 kg) was imported under customs tariffs 3808912000, which indicates that they were pesticides, i.e. insecticides based on chlorinated hydrocarbons and the POPs Pesticides Inventory Group concluded that there is a possibility that there were POPs pesticides among them as well.

Preliminary inventory of POPs pesticides showed that in BiH there are no stockpiles of POPs pesticides. However, packaging disposal of POPs pesticides, particularly of endosulfan and lindane, was dealt with in an uncontrolled and disorganized manner, because in BiH there was no organized way for disposing of packaging of hazardous chemicals and packaging waste. Locations which the POPs Pesticides Inventory Group identified as potentially contaminated with POPs pesticides are large production conglomerates with intensive agricultural production (Gradiska, Samac, Banja Luka, Sarajevo, Mostar, Orasje) which were active and forty years ago, and therefore there is a possibility that on these surfaces some of POPs pesticides may have been used.

Key issues in addressing the current situation in management of POPs pesticides, identified during developing the preliminary inventory, are the lack of adequate legislation in the field of POPs pesticides and discrepancy in the adoption of laws and bylaws in FBiH, RS and BD, inadequate customs tariffs for monitoring of imports of POPs pesticides, lack of a fully established system for handling empty and used packaging of pesticides, inadequate monitoring of POPs pesticides, and allocation of responsibility for the management, control and monitoring of POPs pesticides among more than 10 institutions at the state and entity levels.

### **Preliminary inventory of polychlorinated biphenyls (PCBs) - Annex A, Part II of the Stockholm Convention**

The preliminary inventory of PCBs, prepared by PCBs Inventory Group, has shown that PCB mixtures were never manufactured in BiH, nor was there any production of equipment containing PCBs. Liquids containing PCBs are still being used mostly in closed systems (in the power equipment). During the military siege (1992-1995) in BiH a large number of power generation equipment was damaged and many identification plates on these devices went missing.

According to data collected during the inventory, the following quantities of PCBs in closed systems were identified:

Known presence of PCBs		Suspected presence of PCBs	
42 transformers	57.75 tonnes	253 transformers	164.00 tonnes
661 capacitors	21.04 tonnes	12 capacitors	-
Barrels	3.20 tonnes	switches	3.90 tonnes
81.99 tonnes		167.90 tonnes	

In stocks of PCBs, referring to equipment containing PCBs, which is, although functioning, not put into operation, there is one registered transformer with PCBs, weighing 5.91 t. During the inventory developed by the PCB Inventory Group, no capacitors were found in stocks.

Power generation equipment in BiH (transformers and capacitors) containing PCBs mainly came from regional factories Minel and Avala (Serbia) and Iskra (Slovenia). Devices that were brought from Slovenia and Serbia until the year 1992 were not recorded, because until then Bosnia and Herzegovina was a part of SFRY. For the period from 1992 to the present day it is not possible to obtain information on the import of equipment containing PCBs, since the customs tariff, on the basis of which it is possible to obtain information on import of goods in BiH, has no specific tariff number for transformers/capacitors containing PCBs.

Data on import of polybrominated and polychlorinated biphenyls and polychlorinated terphenyls are listed as imports of PCBs, because in the Customs Tariff of BiH all these compounds share the same tariff code. According to these data (source: Agency for Statistics of BiH), about 350 kg of PCBs was imported in BiH in the period from 2008 to 2013.

The only export of PCBs from BiH refers to the export of waste containing PCBs, which was carried out in accordance with the principles and rules of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. This refers to the export of transformers, capacitors and other PCB wastes. According to data from the Basel Convention in 2003 and 2006, nearly 131 tons of waste containing PCBs was exported from BiH, whereas according to the obtained data from the Agency for Statistics of BiH, nearly 2.500 tons of waste that, according to the existing Customs Tariff in BiH, might contain PCBs was exported in the period 2008-2013.

The total amount of waste containing PCBs which is ready to be exported from BiH for final disposal and destruction amounts to 106.167 kg of which 72% are capacitors, 25% transformers and 3% oil in barrels.

Locations potentially contaminated with PCBs in BiH are identified within Brown Coal Mines "Đurđevik" and "Breza", and Elektrodistribucija Zenica, due to inadequate storage of equipment containing PCBs.

Key issues in addressing the current situation in management of PCBs, identified during developing the preliminary inventory are the lack of adequate legislation in PCB management and discrepancy in the adoption of laws and bylaws in entities, lack of records of equipment containing or contaminated with PCBs in authorized state and entity institutions of BiH, lack of records of sites contaminated with PCBs, inadequate customs tariffs for monitoring import of PCBs in BiH, inadequate storage of equipment contaminated with PCBs and lack of knowledge on adequate management of PCBs of persons working with equipment containing PCBs.

#### **Preliminary inventory of polybrominated diphenyl ethers (PBDEs) - Annex A, Part IV and Part V of the Stockholm Convention and hexabromobiphenyl (HBB)**

Polybrominated diphenylethers (PBDEs) and hexabromobiphenyl (HBB) were added to the list of the Stockholm Convention by the Conference of the Parties in 2009. Due to low production and limited use, most materials containing HBB were disposed of decades ago<sup>1</sup> and therefore they were not included in the inventory.

During development of the preliminary inventory, PBDEs/ PFOS Inventory Group concluded that chemicals with the collective term PBDEs were most often used for treatment of polyurethane foam used in the transport sector. In addition, PBDEs were used in the manufacture of the housings of electrical and electronic equipment (EEE), therefore the

<sup>1</sup> „Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants“ (UNEP, 2012)

PBDEs/PFOS Inventory Group focused on the inventory of the substances which were applied in the transport sector and EEE in BiH.

The preliminary inventory has shown that PBDEs are not produced in BiH, they are only used in products that are manufactured in or imported to BiH.

Based on UNEP Guidelines<sup>2</sup> and using data obtained, the PBDEs/PFOS Inventory Group calculated PBDEs in EEE (Table 0. 1) and transport sector (Table 0. 2). The greatest amount of PBDEs in electronic and electrical equipment was found in the equipment of users, while the maximum amount of PBDEs in the transport sector were found in the vehicles imported in 2012.

Homologues	PBDEs in imported EEE 2012 (kg)	PBDEs in stocks 2013 (kg)	PBDEs that enter the waste chain 2013 (kg)
HexaBDE	42	2,324	424
HeptaBDE	163	9,086	1,657

Table 0. 1:  
Calculation of PBDE homologues in EEE in BiH

Homologues	PBDEs in currently used vehicles in 2013 (kg)	PBDEs in imported vehicles 2012 (kg)	PBDEs in end-of-life vehicles (ELV) 2011 (kg)
TetraBDE	137	301,699	76
PentaBDE	2,412	530,260	134
HexaBDE	33	73,139	19
HeptaBDE	2	4,571	1

Table 0. 2:  
Calculation of PBDE homologues in the transportation sector in BiH

Key issues in the current situation in management of PDBEs, identified during developing the preliminary inventory are the lack of records of the quantities of second-hand EEE imported and exported from BiH, and the status of such equipment, and lack of records of vehicles that reached their end-of-life (ELV), nor are they disposed of in an environmentally sound manner.

#### Preliminary inventory of perfluorooctan sulfonate (PFOS) its salts and perfluorooctane sulfonyl fluoride (PFOSF) - Annex B, Part III of the Stockholm Convention

Perfluorooctan sulfonate (PFOS) was added to the list of the Stockholm Convention by the Conference of the Parties in 2009. Products that contain PFOS are textiles, furniture, clothing, leather products and various industrial and household cleaning products. In addition, significant use of PFOS is in fire-fighting foams for extinguishing fires caused by liquid fuels. The preliminary inventory showed that BiH has never manufactured PFOS, but only imported products that may contain PFOS.

The preliminary inventory of PFOS in BiH was based on statistical data on imports, production and export of consumer products and questionnaires sent to significant consumers of fire-fighting foam, such as fire brigades, etc.

Based on the responses the PBDEs/PFOS Inventory Group received from the questionnaires, the total quantity of fire-fighting foam in stocks in BiH amounts to 8,455 litres, i.e. range of amounts of PFOS in BiH is approximately 4-13 litres.

In accordance with the statistical data (source: Agency for Statistics of BiH and Indirect Taxation Authority of BiH) the PBDEs/PFOS Inventory Group has calculated the PFOS chemicals in consumer goods, as showed in Table 0. 3.

Category of item or preparation	Amount of PFOS (tons per year) lowest/highest value		
Fire-fighting foam	2	-	7
Insecticides	56	-	556
Coating and impregnation of synthetic carpets	8	-	84
Coating and impregnation of textiles	0.673	-	7
Coatings and coating additives	26	-	266
Cleaning and polishing agents, wax	10	-	20
<b>TOTAL annual amount of PFOS (t) based on statistics</b>	<b>47</b>	<b>-</b>	<b>284</b>

Table 0. 3:  
Amount of PFOS in BiH in 2012, according to statistics

<sup>2</sup> Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants" (UNEP, 2012)

The main problems the PBDEs/PFOS Inventory Group identified during developing the preliminary inventory are the inconsistency in adopting laws and bylaws in the entities and BD (in FBiH and BD legislation that restricts and/or prohibits the manufacture, marketing and use of PFOS has not been adopted), inconsistency in the labels of products in statistical data on production and the customs tariff for imported and exported products, insufficient knowledge of the characteristics of PFOS and their presence in products in consumer products from relevant stakeholders.

### Preliminary inventory of unintentional production and release of chemicals – Annex C of the Stockholm Convention

The following unintentionally produced POPs are listed in Annex C of the Stockholm Convention:

- Polychlorinated dibenzo-p-dioxins (PCDD)
- Polychlorinated dibenzofurans (PCDF)
- Polychlorinated Biphenyls (PCB)
- Hexachlorobenzene (HCB)
- Pentachlorobenzene (PeCBz)

The preliminary inventory of unintentional production of chemicals listed in Annex C of the Stockholm Convention is based on the methodology prescribed by the UNEP Toolkit<sup>3</sup> from 2013. In accordance with the recommendations of the UNEP Toolkit (2013), inventory of unintentional production and release of chemicals listed in Annex C in BiH was focused on PCDDs/PCDFs because these substances indicate the presence of other unintentionally produced POPs, i.e. PCDD/PCDF emissions are followed by emissions of other unintentionally produced POPs, which can be eliminated or minimized by the application of the same measures used in dealing with PCDD/PCDF emissions.

The preliminary inventory of PCDD / PCDF in BiH has shown that the most significant routes of PCDD/PCDF release is to residue/waste (55.23%), followed by air emissions (43.69%). Unintentionally produced POPs mostly occur from waste generated during ferrous and non-ferrous metal production (65.45%). Releases of unintentionally produced POPs into air mostly occur due to heat and power generation (65.24%).

Calculation of total PCDD/PCDF emissions into the environment in BiH for 2012 performed by PCDD/PCDF Inventory Group is shown in Table 0. 4.

Table 0. 4:  
Estimate of total PCDD/  
PCDF emissions  
(g TEQ/a) into the  
environment in BiH for  
2012

Total amount of PCDD/PCDF releases in 2012 (g TEQ /a)				
Air	Water	Soil	Product	Residue
93.5	0.5	0.1	1.8	118.2

According to UNEP Toolkit (2013), PCDD/PCDF Inventory Group identified and 11 potential contaminated areas and hot spots for all categories of pollution sources, where some industrial activity took place or is still taking place.

The preliminary inventory of PCDD/PCDF has shown that no systematic monitoring of environment for presence of PCDD/PCDF and other unintentionally produced POPs is performed in BiH, nor there are records of areas contaminated with chemicals listed in Annex C of the Stockholm Convention in ministries responsible for the environment in BiH.

### Summary of future production, use and release of POPs

In BiH, majority of POPs pesticides was banned 40 years ago, while lindane and endosulfan active substance pesticides were banned in 2008. According to the applicable legislation, no future production or use of POPs pesticides is envisaged in BiH.

No PCB mixtures have ever been nor are produced in Bosnia and Herzegovina. According to applicable legislation, no production of any PCB or equipment containing PCB is envisaged. Legal and operational measures and activities envisaged under this NIP imply phasing out of the use of equipment containing or contaminated by PCB by 2025 at the latest, as required by the Convention.

3 “Toolkit for Identification and Quantification of Releases of Dioxin and Furan and other Unintentional POPs” (UNEP 2013)

In accordance with the *EC Regulation no. 757/2010*, amending *EC Regulation no. 850/2004*, a group of compounds commonly called polybrominated diphenyl ethers (PBDEs) is on the list of substances the marketing and use of which is restricted by percentage and by date of placing on the market. The provisions of this Regulation have been transposed to the legislation of RS, however, in FBiH and BD no legislation governs this area. BiH will have to respect the provisions of the said Regulation stipulating the limited use of these compounds. However, only after a detailed inventory of these substances is prepared one would be able to determine their exact quantities, which will be used to assess their future use.

Future projections of unintentional release of chemicals referred to in Annex C shall be assessed after the strategies to reduce emissions are drafted and adopted.

### **Existing programs for monitoring emissions and the impact on the environment and human health**

During the development of the inventory, the Environment, Health, Research and Development Group determined that competent institutions engaged in air quality monitoring do not carry out measurements of concentrations of POPs substances, as there is no legal basis in the current legislation in BiH for such activities. Also, systematic monitoring of substances which are on the list of the Stockholm Convention in waters is not conducted. However, institutions in BiH carry out periodic monitoring and measurement of POPs substances in waters (rivers and lakes) as shown in Chapter 2.3.9 and Annex 9. Monitoring of the concentration of POPs in soil is not conducted, except for PAH, and only in FBiH. According to the *Regulation on maximum residue levels of pesticides in or on food and feed of plant and animal origin* (Official Gazette of BiH, No: 89/12) the Food Safety Agency of BiH is, in cooperation with the Plant Health Protection Administration of BiH and Veterinary Office of BiH, developing a multi-year program for controlling pesticide residues in BiH. However, the Environment, Health, Research and Development Group has only obtained from the Food Safety Agency of BiH the aggregated data on the number of samples and the percentage of inadequate samples, while there was no data on analysis of traces of PCBs and other substances that are on the list of the Stockholm Convention. There is no institution responsible for systematic monitoring of POPs in the biome and there are no results of systematic monitoring. Based on the laws and bylaws, the owner (the producer, i.e. the industrial organization in which the waste is generated) is responsible for the waste monitoring. In the publicly accessible reports and statistical yearbooks there are no data on the results of monitoring of hazardous chemical compounds in waste, by which this waste is classified as hazardous waste.

In BiH there are no relevant indicators of human exposure to chemicals from the list of the Stockholm Convention, nor are there data and assessment of their impact on the health of the population of BiH.

The Environment, Health, Research and Development Group has found that the most significant shortcomings of existing programs for monitoring of emissions and impacts on the environment and human health are the missing legal acts and regulations that should completely define the monitoring of POPs in the environment, questionable public data and monitoring results and the scarcity of capacity of the institutions in BiH to carry out analysis and monitoring.

### **Technical infrastructure for POPs assessment, measurement, analysis, alternative and preventive measures, management, research and development**

The preliminary inventory has shown that the current monitoring of POPs in the environment in BiH is performed institutionally, through the authorized institutions, and non-institutionally through periodic monitoring which is carried out through the implementation of scientific research projects.

In BiH three laboratories are accredited by the Institute for Accreditation of BiH (BATA), for examining POPs in BiH: for determination of content of polycyclic aromatic hydrocarbon and organochlorinated pesticides (Water Institute Ltd. Bijeljina), determination of heptachlor, aldrin, heptachlor epoxide, endosulfan, dieldrin, etc. in waters (SYSTEM QUALITA, S Ltd. - Testing Laboratory Pale), and determination of organochlorine pesticides in milk and milk products (Federal Agro-Mediterranean Institute Mostar - Testing Laboratories).

During the last thirteen years five research projects pertaining to research the presence of POPs in the environment have been implemented in BiH:

- APOPSBAL - Assessment of the selected POPs (PCBs, PCDDs/Fs, OCPs) in the atmosphere and water ecosystems from the waste materials generated by warfare in former Yugoslavia (RECETOX 2001-2003)

- Persistent Pollutants in Rivers in Bosnia and Herzegovina (NIVA 2006-2009)
- Capacity Building for Local Implementation of the Stockholm Convention in BiH (BiHNoPOP) (NIVA 2009-2011)
- Development of a Decision Support System for Reducing Risk from Environmental Pollution in the Bosna River (Overview of Ongoing Multy-Year Science for Peace Projects, 2011) (WRI Bratislava 2011-2014)
- Cooperation and Capacity Building on Implementation of the Stockholm Convention in BiH (NIVA 2012-2014)

The following laboratories were trained for determining PAHs, PCBs and the organochlorine pesticides in the framework of the implementation of above mentioned projects:

- Laboratory of the Hydro-Engineering Institute of Civil Engineering Faculty at the University of Sarajevo
- Laboratory of the Faculty of Pharmacy at the University of Sarajevo
- Laboratory of the Institute of Protection and Ecology of Republika Srpska, Banja Luka.

**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**

During the development of the inventory of POPs in BiH, the Environment, Health, Research and Development Group was unable to find information about the systematic research on the impact of POPs on human and environmental health, nor could they find any published results related to the systematic and continuous monitoring of these compounds in soil and sediment, air, water, waste, biome and food in BiH.

Certain data were obtained by the implementation of the following projects:

- Project APOPSBAL – “Assessment of the selected POPs (PCBs, PCDDs/Fs, OCPs) in the atmosphere and water ecosystems from the waste materials generated by warfare in former Yugoslavia” (Research Centre for Toxic Compounds in the Environment – RECETOX and Federal Institute for Geology - Sarajevo), 2001 – 2003 financed by the European Union within the Fifth Framework Programme for Research and Technological Development (FP5);
- “Persistent Pollutants in Rivers in Bosnia and Herzegovina” (Norwegian Institute for Water Research (NIVA) and the Faculty of Pharmacy at the University of Sarajevo), 2006-2009;
- Project MONET\_CEEC (Research Centre for Toxic Compounds in the Environment), 2006
- Project NATO ESP.EAP.SFP 984 073 “Development of decision support systems to reduce the risk of environmental pollution of the Bosna River “, which is in the final stage of implementation. This project is implemented by the Hydro-engineering Institute of the Faculty of Civil Engineering, University of Sarajevo in cooperation with the National Reference Laboratory for Water, Bratislava, Slovakia.

Project APOPSBAL, which was in BiH implemented by RECETOX, in collaboration with the Federal Institute for Geology, was focused on:

- i. measuring POPs substances in the air by applying a passive system with filters made from polyurethane foam (air sampling was carried out at the site Ivan Sedlo in 2004);
- ii. research of PCB content in river sediments at different locations in Bosnia and Herzegovina (in the period 2002-2005, sampling and analysis of river sediments in the regions Sarajevo, Bihać and Tuzla), and
- iii. research of PCB content in soil (in the period 2002 to 2005, sampling and analysis of soil in the regions Banja Luka, Sarajevo, Jelah and Bihac).

Within the project “Persistent Pollutants in Rivers in Bosnia and Herzegovina” which was in BiH implemented by NIVA, in collaboration with the Faculty of Pharmacy, the University of Sarajevo, the following measurements were carried out:

- i. PCB content in river sediments (during 2008 and 2009, tests conducted on POPs content in the sediment from the river Bosna, by using the semipermeable membrane devices for passively sampling from water (SPMD) and fish). The locations where the sediment sampling was conducted are: Vrelo Bosne, Bosna at the Roman bridge in Sarajevo, Semizovac, Bosna at the river mouth Lašva, Bosna in Žepče, Bosna in Doboj – upstream and downstream, Bosna at the river mouth Spreča, Bosna in Modriča and Bosna in Bosanski Šamac;



- ii. POPs content in the river water (during 2007, performing tests to determine the presence of POPs in the water of the river Neretva (one of the two largest rivers in BiH), at locations Glavatičevo-Lađanica, Salakovac and Gabela).

Project MONET\_CEEC was focused on measuring POPs substances in the air. During the project implementation in 2006, air samples containing POPs were collected at two locations in Bosnia and Herzegovina: in Banja Luka, at the site of the factory Incel, near the place where transformers are stored, and in Modriča, at the site of an oil refinery).

Project NATO ESP.EAP.SFP 984 073 "Development of decision support systems to reduce the risk of environmental pollution of the Bosna River" was focused on examining the content of POPs in sediments and river water river Bosna.

During the developing of the inventory, the Environment, Health, Research and Development Group was unable to find neither information on systematic studies about the effects of POPs on human health in BiH, nor data on the assessment of public health risks associated with the presence of these substances in the environment and food.

## Priorities for POPs management

The main objective of the NIP is to protect the environment and human health from the adverse effects of POPs chemicals. In order to achieve this objective and to meet the obligations arising from the Stockholm Convention, relevant stakeholders together with members of the PNSC have determined priorities for management of POPs in BiH, which were based on the results of a preliminary inventory of POPs and agreed upon at the Priority Validation Workshop:

1. Improving and creating an adequate legal framework related to all aspects of management of POPs chemicals listed under the Stockholm Convention and aspects of environmental protection (including hazardous waste);
2. Strengthening the capacities for monitoring of POPs in the environment and humans, including the identification of waste and locations potentially contaminated with POPs ("hotspots");
3. Reduction of emissions of unintentionally produced POPs (Annex C) from industry and other sources and strengthening the inspection and other capacities for control;
4. Strengthening the technical capacities for collecting, organizing, structuring and processing data on POPs in BiH, including the establishment and coordination of information systems in FBiH, RS and BD and improving the exchange of information between the competent institutions;
5. Ensuring adequate management of hazardous wastes (with a focus on waste containing POPs substances) and contaminated areas ("hotspots");
6. Ensuring adequate management of PCBs and equipment containing or contaminated with PCBs, including prior detailed inventory;
7. Establishment of coordination mechanism and enhancement of the institutional framework for the implementation of the Stockholm Convention, and the allocation of responsibilities for all aspects of POPs management in existing institutional frameworks;
8. Introduction of economic measures for environmental protection and the implementation of the Stockholm Convention;
9. Education and raising awareness among the public and target groups;
10. Establishment of criteria and mechanisms for the customs control of import, export and transit of pesticides, used cars, EEE, and other equipment and products that potentially contain POPs;
11. Enabling public access to all information related to the implementation of the Stockholm Convention, the results of the monitoring of pollutants and the results of health studies on the effects of POPs on the population in BiH.

## Strategy and action plan elements of the national implementation plan

NIP contains 19 strategies and action plans, which specify the measures and activities that need to be implemented in order to ensure the implementation of the Stockholm Convention in BiH, the institutions responsible for their realization, as well as the time frame and the estimated necessary funds. The activities envisaged by the NIP are aimed at improving management of chemicals and wastes through comprehensive addressing of problems related to POPs.

The formal implementation of the NIP is expected to commence in 2015/2016, after the adoption of the document and providing necessary financial resources.

### **Organizational framework for the implementation of the NIP**

In accordance with the conclusions adopted by the Council of Ministers from 2002, the Ministry of Foreign Trade and Economic Relations of BiH was nominated as focal point for coordinating the cooperation with international organizations and authorities of the Stockholm Convention.

The institutions responsible for the implementation of the Convention in BiH are:

- The Ministry of Foreign Trade and Economic Relations of BiH
- In FBiH: The Federal Ministry of Environment and Tourism
- In RS: The Ministry of Physical Planning, Civil Engineering and Ecology of RS
- In BD: The Department for Spatial Planning and Property Affairs of the BD Government

Certain obligations arising from the provisions of the Convention are the responsibility of other state and entity bodies. All institutions in BiH, FBiH, RS and BD, as well as other key players responsible for the implementation of activities proposed in the NIP, were identified in the action plans. In the Entities, the coordination of activities carried out by the said bodies, industry and other stakeholders is performed by the Federal Ministry of Environment and Tourism, the Ministry of Physical Planning, Civil Engineering and Ecology of RS and the Department of Spatial Planning and Property Affairs of BD, within their jurisdictions. Coordination of all activities carried out by state and entity institutions/organizations, and institutions of the BD, is conducted by the Ministry of Foreign Trade and Economic Relations.

In order to ensure the implementation of the Stockholm Convention through synergies with the Rotterdam and Basel Convention, and the successful implementation of the NIP, in the short term it is necessary that institutions responsible for the implementation of the Convention in BiH establish an effective and reliable mechanism of coordination between the Ministry of Foreign Trade and Economic Relations of BiH, as the focal point for the coordination of cooperation with international structures and organs of the Stockholm Convention, and the institutions responsible for the implementation of the Convention in the Entities (FMET, MPPCEE and DSPPA).

Measures and activities for management of POPs identified in the action plans are presented in Table 0. 5.

Action Plan /Strategy	Activity
Institutional and regulatory strengthening measures	<ul style="list-style-type: none"> <li>▪ Pass a lex specialis Law on POPs at FBiH, BD and RS level to regulate in detail the entire lifecycle of all chemicals mentioned in the Stockholm Convention</li> <li>▪ Insert/update/amend provisions on POPs in the relevant legal regulations in FBiH, RS and BD (Law on Environment, Law on Waste Management, Law on Air Protection,...)</li> <li>▪ Adopt laws on chemicals and biocides in FBiH and BD: revise the draft of the FBiH Law on Chemicals to harmonize it with the provisions of the Stockholm Convention and accelerate its passing, and prepare and adopt the Law on Chemicals in BD</li> <li>▪ Pass relevant bylaws in accordance with Regulation (EC) 1907/2006 ("REACH")</li> <li>▪ Pass a Regulation on Terms to Limit and Ban Production, Circulation and Use of Chemicals, to include chemicals listed in the Stockholm Convention, and align it with Commission's Regulation (EC) No. 757/2010 on POPs, amending Regulation No. 850/2004</li> <li>▪ Adopt all EU standards and recommended procedures to measure POPs in environment and food</li> <li>▪ Adopt the missing and update the existing legal documents in FBiH, RS and BD related to POPs, in accordance with the Stockholm Convention and EU regulations</li> <li>▪ Appoint specific institutions for the implementation of the Stockholm Convention, laboratories for sampling and analysis and inspection bodies through relevant laws at FBiH, RS and BD level</li> <li>▪ Establish an effective and reliable coordination mechanism between MOFTER and institutions responsible for Stockholm Convention in the entities and BD (FMET, MPPCEE and DSPPA) with clearly defined obligations and responsibilities for the implementation of the Convention</li> <li>▪ Appoint persons/units responsible for the implementation of the Stockholm Convention in the institutions</li> <li>▪ Appoint relevant bodies to monitor the implementation of the Stockholm Convention (including emissions and imissions of unintentionally produced POPs) within the appropriate ministries at entity and BD level</li> <li>▪ Appoint bodies at BiH, entity and BD level responsible for continued development, specialization and sub-specialization through university faculties and institutions appointed to control POPs</li> <li>▪ Prepare and implement a detailed plan of training and education about the impact of POPs chemicals (including inspection and customs staff) in bodies responsible for management of POPs chemicals and waste containing POPs, which will define specific programs for education and capacity building</li> <li>▪ Organize training programs for inspection bodies in accordance with the detailed plan for training and education</li> <li>▪ In BD, establish an Environmental Protection Fund, in accordance with the Strategy of Environmental Protection of BD for the period 2013 - 2023 (draft at a public hearing)</li> <li>▪ In RS and BD introduce a fee for the waste management of electronic and electrical products modelled after the system in FBiH</li> <li>▪ Introduce a fee for ELV management</li> <li>▪ Introduce compensation for accidental releases of POPs into the environment (Annex C), which would be paid by industries identified as a potential source in the preliminary inventory</li> <li>▪ Prescribe fines for non-compliance with regulations on the emissions of pollutants</li> <li>▪ Amendment to the Customs Tariff relating to: <ul style="list-style-type: none"> <li>– POPs pesticides</li> <li>– Equipment with PCBs (transformers and capacitors containing PCBs)</li> <li>– Electrical and electronic equipment produced before 01.07.2006.</li> <li>– Fire-fighting AFFF foam, hydraulic oils for civil aviation</li> </ul> </li> <li>▪ Organize training program of the Indirect Taxation Authority (Customs Sector) for: <ul style="list-style-type: none"> <li>– control of illegal import of POPs pesticides</li> <li>– control of illegal imports of products and equipment containing PCBs</li> <li>– control of import / export of used cars and furniture and EEO (related to Activity 2.2.3 of the Action Plan 3.3.5)</li> <li>– control of illegal import / export of equipment that may contain PBDEs</li> <li>– control of illegal import / export of PFOS</li> </ul> </li> <li>▪ Enhance control at border crossings to prevent illegal import of POPs</li> </ul>

Table 0. 5:  
Overview of activities identified in action plans and strategies for implementation of the Stockholm Convention in BiH

Action Plan /Strategy	Activity
<p>Manufacture, Import and Export, Use, Stockpiles and Waste of POPs Pesticides (Annex A, Part I)</p>	<ul style="list-style-type: none"> <li>▪ Organization of training programs for the competent institutions on the management of pesticides and disposal of waste containing pesticides</li> <li>▪ Organization of training programs for inspection bodies on the transport of pesticides</li> <li>▪ Creating new by-laws and updating existing legislation in order to build a uniform system for registration and import of plant protection products (Regulation on the content of the documentation necessary for the registration of plant protection products) and biocides (in FBiH and BD)</li> <li>▪ Drafting of a regulation that would regulate the mandatory data entry of imported pesticides at border crossings in BiH</li> <li>▪ Updating existing databases with information on biocides and plant protection products in the RS and preparing those in the FBiH and BD</li> <li>▪ Training employees of institutions responsible for maintaining registers of chemicals and harmonizing information on POPs chemicals with existing registry</li> <li>▪ Drafting the following regulations: <ul style="list-style-type: none"> <li>▪ Regulation on technical and human resource conditions to be fulfilled by a company engaged in the formulation of biocides and pesticides - in FBiH and BD and for plant protection products in RS</li> <li>▪ Regulation on recording and inventorying the amount formulated and repackaged preparations</li> </ul> </li> <li>▪ Purchase of eight (8) containers which would be placed before the agricultural pharmacies in Gradiska, Bijeljina, Mostar and Gradačac</li> <li>▪ Drafting legal framework which would define the obligations and procedures for waste disposal of plant protection products, as well as the packaging of the used plant protection products</li> <li>▪ Samples and analysis of the POPs pesticides (DDT, lindane, endosulfan) from seven locations proposed in the preliminary inventory: <ul style="list-style-type: none"> <li>▪ AIPK „Mladen Stojanović“ – Nova Topola</li> <li>▪ „Plantaže Gradiška“ – Trebovljani</li> <li>▪ PIK „Šamac“ – Šamac</li> <li>▪ Economy Agricultural Institute Banja Luka - Banja Luka- Trapisti</li> <li>▪ Agricultural Institute Sarajevo - Butmir</li> <li>▪ „HEPOK“ Mostar</li> <li>▪ „Bosanac“ Orašje</li> </ul> </li> <li>▪ Identification and remediation of sites contaminated with POPs pesticides</li> <li>▪ Development of Regulation on obligation to control the content and composition of pesticides</li> <li>▪ Development of existing laboratories to analyze the content of pesticides and establishing a plan to control the substances listed in the Stockholm Convention in pesticide compositions</li> <li>▪ Introducing agronomists from professional services and importers and distributors of pesticides, as well as agronomists from the agricultural pharmacies, and authorized companies for DDD: Present obligations of the Stockholm Convention related to pesticides (plant protection products and biocides) in the form of professional work and release papers on conferences of agronomists held in Teslić, Neum and Trebinje and other relevant meetings.</li> <li>▪ Promoting the proper use of pesticides for users of phyto-pharmaceutical products: <ul style="list-style-type: none"> <li>▪ a) holding lectures about the appropriate use of pesticides in accordance with the Regulation on obligations of users of phyto-pharmaceutical products and biocides</li> <li>▪ b) Promote the concept of “green chemistry” in the field of pesticides: production of the brochure under the name “Green chemistry and pesticides”</li> </ul> </li> </ul>

Action Plan /Strategy	Activity
Production, import and export, use, identification, labelling, removal, storage and disposal of PCBs and equipment containing PCBs (Annex A, Part II)	<ul style="list-style-type: none"> <li>▪ Organize training program for inspection bodies on PCBs and equipment containing or is contaminated with PCBs</li> <li>▪ Increase inspection in terms of notifying equipment containing PCBs to the relevant inspection and other relevant institutions</li> <li>▪ Develop and adopt by-laws that prohibit the production, import, transport and use of the equipment or liquids that may contain PCBs</li> <li>▪ Develop and adopt Regulation on handling and disposal of equipment and waste containing PCBs</li> <li>▪ Update existing legislation on waste management that will prohibit recovery, recycling and reuse and direct reuse or alternative use of liquids containing PCBs above 0,005%, and define the obligation to register equipment containing PCBs and PCB wastes with relevant institutions, as well as to register accidents where the leakage of PCBs to the environment occurred</li> <li>▪ Develop and adopt legislation that establishes deadlines for replacing equipment containing PCBs and deadlines for the disposal of waste containing PCBs</li> <li>▪ Develop and adopt appropriate by-laws regulating the measures for safe and healthy work when exposed to chemical substances, carcinogens or mutagens</li> <li>▪ Develop technical guidelines for identification and environmentally sound management (decontamination, storage, transport and final disposal) of equipment or products containing or contaminated with PCBs</li> <li>▪ Organize training of technicians and service personnel for the proper maintenance of equipment containing PCBs</li> <li>▪ Establish databases of owners of equipment containing or contaminated by PCBs and PCB waste</li> <li>▪ Develop procedures for verification of the data obtained from the owner of the equipment and waste containing PCBs</li> <li>▪ Perform a detailed inventory of equipment containing or contaminated with PCBs and PCB waste</li> <li>▪ Regularly update databases of owners of equipment containing PCBs and PCB waste</li> <li>▪ Develop guidelines for identification of PCBs in open systems</li> <li>▪ Develop a report on equipment and waste containing PCB (for reporting in accordance with the requirements of the Convention)</li> <li>▪ Develop and implement a phase-out management plan to exclude from use / decontaminate equipment containing or contaminated with PCBs</li> <li>▪ Identify the necessary capacities and establish temporary storage facilities for PCB waste, as part of hazardous waste storage</li> <li>▪ Safely dispose of equipment containing PCBs</li> </ul>

Action Plan /Strategy	Activity
<p>Production, import and export, use, stockpiles and wastes hexaBDE and heptaBDE (Annex A, Part IV) i tetraBDE i pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I)</p>	<ul style="list-style-type: none"> <li>▪ Develop and adopt a bylaw (Regulation) governing the placing on the market of products containing commercial c-OctaBDE in accordance with Directive 2003/11 / EC</li> <li>▪ In RS and BD develop and adopt regulations on the management of waste from electrical and electronic products harmonized with the same in the Federation and with the Directive 2002/96/EC, and compliant with the new Directive 2012/19/EC, which entered into force on 14 February 2014</li> <li>▪ In FBiH harmonize the <i>Regulation on Management of Waste from Electrical and Electronic Products</i> with the new Directive 2012/19/EC, which entered into force on 14 February 2014</li> <li>▪ In Entities and BD, prepare and adopt regulations governing the obligation to register end-of life vehicles (ELVs) in accordance with Directive 2000/53/EC on ELVs, and incorporate in the <i>Regulation on Vehicle Registration</i>(Official Gazette of BiH, No. 69 / 09) an obligation to have ELV vehicles registered in IDDEEA database</li> <li>▪ In legislation dealing with waste management, insert obligation to incorporate BAT/BEP approaches to recycling and managing end-of lifecycle products, which are a significant source of POPs PBDEs (furniture, insulation foam, vehicles and EEE)</li> <li>▪ Align or prepare and adopt legislation harmonized with the Directive 2011/65/EC (“RoHS 2 Directive”) on the restriction of hazardous substances in EEE. The development of this legislation is underway in RS.</li> <li>▪ In Entities and BD, adopt legislation governing the management of waste from ELVs in accordance with Directive 2000/53/EC</li> <li>▪ Create new or update existing database that will contain information on PBDEs</li> <li>▪ Establish a data register, which will contain information about imported, registered and end-of life vehicles per country of origin and year of production - introduce origin as an additional element in the existing database and link it with a database on POPs</li> <li>▪ Improve existing databases used by ITA to record imports of used EEE goods by year of production and origin - introduce year of production as an additional element in the existing database of customs tariffs and link it with a database of POPs chemicals</li> <li>▪ Introduce a voluntary system of composition declaration for EEE (such as Joint Industry Guide), which would contribute to compliance with the legislation on EEE management. In accordance with this system, suppliers are obliged to report the presence of problematic materials and substances. The specific objective is to provide consistent and standardized declaration to entire supply chain in the production of EEE</li> <li>▪ Develop a detailed inventory of PBDEs, which covers the entire lifecycle of these substances in BiH, based on the guidelines of UNIDO and during the next review of the NIP</li> <li>▪ In accordance with the existing legal and institutional set up (at entity level), create a database on waste EEE according to year of manufacture and origin, at the level of system operators and link it with databases of POPs and registers of plants and pollution</li> <li>▪ Link a database of ELV, led by IDDEEA, with existing databases that will contain information on POPs and databases that are kept as part of the implementation of the Basel and Rotterdam Convention in BiH</li> <li>▪ Introduce and implement systems for speedy detection of the presence of PBDEs in second hand imported EEE, furniture and vehicles (e.g. “sliding spark spectroscopy” technology)</li> <li>▪ Ensure implementation of provisions of the legislation (laws on waste management in the FBiH, RS and BD) which prohibits disposal of hazardous waste with municipal waste at municipal landfills</li> <li>▪ Develop waste management plans containing PBDEs (WEEE, ELV, furniture) at the level of entities and cantons (in FBiH) while respecting the principles of the existing environmental protection and waste management strategies</li> <li>▪ Safely dispose of equipment containing PBDEs in accordance with legal provisions in force</li> <li>▪ In RS and BD establish a system operator for managing electrical and electronic waste that will coordinate its activities with the operator of the system in FBiH, and exchange data to ensure effective management of the systems</li> <li>▪ Implement a pilot project in selected car scrap yards in order to verify the introduction of the concept of authorized centres for the disposal of ELVs at the state level, or to examine the appropriate model for BiH</li> <li>▪ Establish authorized centres for the disposal of ELVs and maintain databases on the amounts of separated polymers containing PBDEs in accordance with Regulations on Waste Categories with Lists in FBiH, RS and BD</li> <li>▪ Procure adequate equipment for the rapid detection of the presence of PBDEs in WEEE, ELV and furniture</li> <li>▪ Educate staff to use equipment for the rapid detection of the presence of PBDEs</li> <li>▪ Prepare the report on equipment and waste containing PCBs</li> <li>▪ Educate staff of inspection bodies in FBiH, RS and BD on equipment on market that may contain PBDEs (WEEE, ELV, furniture, polyurethane foam, etc.)</li> <li>▪ Increase inspection in terms of registering equipment containing PBDEs to market inspection and other relevant institutions</li> </ul>

Action Plan /Strategy	Activity
Production, import and export, use, stockpiles and wastes of PFOS, its salts and PFOSF (Appendix B, Part III)	<ul style="list-style-type: none"> <li>▪ Develop and adopt appropriate by-laws regulating the measures for safe and healthy work when exposed to chemical substances, carcinogens or mutagens</li> <li>▪ Develop new or update existing databases on chemicals with information on PFOS</li> <li>▪ Develop a detailed inventory of PFOS substances in BiH, including fire-fighting foam</li> <li>▪ In RS and BD, develop and adopt regulations on management of waste from electrical and electronic products harmonized with the new Directive 2012/19 / EU ("WEEE Directive"), which entered into force on 14 February 2014</li> <li>▪ Develop waste management plan for waste containing PFOS, including fire-fighting foam</li> <li>▪ Safely dispose of equipment containing PFOS in accordance with the legal provisions in force</li> <li>▪ Educate employees of ITA - Customs Sector (in parallel with activities from <i>Action plan: Production, import and export, use, stockpiles and wastes hexaBDE and heptaBDE (Annex A, Part IV) i tetraBDE i pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I)</i>)</li> <li>▪ Educate employees of the entity and BD inspection authorities, in particular market markets, labour and environmental inspectors (in parallel with activities from <i>Action plan: Production, import and export, use, stockpiles and wastes hexaBDE and heptaBDE (Annex A, Part IV) i tetraBDE i pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I)</i>)</li> <li>▪ Develop strategies for phasing-out of PFOS from use in the industries in which it is used (platinum coating, photolithography) with implementation of BAT/BEP</li> <li>▪ Develop a plan for gradual transition to alternatives to PFOS, with implementation of BAT / BEP</li> <li>▪ Draft report on products and waste containing PFOS</li> <li>▪ Educate technologists in the industry on best practices to phase out the use of PFOS</li> <li>▪ Educate primary users of products (fire-fighting foam) which may contain PFOS - fire brigades, emergency teams in large industrial plants, airports, etc.</li> <li>▪ Educate importers and distributors of consumer products that may contain PFOS</li> </ul>
Register of exemptions and continuing need for exemptions (Article 4)	<ul style="list-style-type: none"> <li>▪ Bosnia and Herzegovina will submit to the Secretariat of the Convention Requests for registration in accordance with Article 4 of the Stockholm Convention</li> </ul>
Measures to reduce emissions from unintentional production (Article 5)	<ul style="list-style-type: none"> <li>▪ Through legal and subordinate legislation, define the limits of unintentionally produced POPs into the environment, ways of monitoring, and meeting the requirements specified in BAT (primarily in heavy and non-ferrous metallurgy and energy production)</li> <li>▪ Strengthen the capacity of employees of ministries and inspections related to the implementation of BAT/BEP in the process of obtaining environmental permits and further control of BAT/BEP implementation to reduce unintentional production of POPs, to ensure comprehensive and long-term emissions monitoring</li> <li>▪ Increase inspection of the implementation of the provisions contained in environmental permits</li> <li>▪ Develop a mechanism to inform industry about the optimization of production processes</li> <li>▪ Promote the introduction of BAT and BEP in industry, energy sector, waste management sector, medical and other institutions, and make BAT and BEP applied in the EU available and user-friendly via the web and other media</li> <li>▪ Implement BAT/BEP measures in the production of iron and non-ferrous metals</li> <li>▪ Apply means to reduce unintentionally produced POPs into the environment (filters, purification systems, non-incineration technology, etc.) from other sources, in accordance with the recommendations of BAT and BEP</li> <li>▪ Appoint and additionally educate (if necessary) responsible laboratories that can perform qualitative and quantitative analysis, and monitor unintentionally produced POPs according to legal provisions</li> <li>▪ Regularly monitor POPs compounds from Annex C of the Convention in industrial entities and other institutions in the sectors of energy, waste disposal and health care that unintentionally produce them, include them into the database, and keep statistical records about changes in the concentration of measured parameters</li> <li>▪ Continuously analyze the effectiveness of implemented BAT and BEP</li> <li>▪ Make a list of all sources of unintentionally produced POPs</li> <li>▪ Ensure timely annual submission to register of plants and pollution of data by businesses and other institutions on emissions of unintentionally produced POPs in all segments of the environment</li> <li>▪ Based on the list of all sources of unintentionally produced POPs, rank polluters to enable taking the necessary steps</li> <li>▪ Record critical points contaminated with unintentionally produced POPs</li> <li>▪ Train the employees of ministries and other relevant institutions related to update of inventory of unintentionally produced POPs and its harmonization with register of plants and pollution</li> <li>▪ Periodically update the inventory of unintentionally produced POPs - estimate the volume of emissions in all segments of the environment</li> <li>▪ Develop reports on the release of unintentionally produced POPs</li> <li>▪ Raise public awareness at all levels of education and all the institutions of civil society through workshops, booklets, leaflets, electronic information in the form of web sites and portals for general population</li> </ul>

Action Plan /Strategy	Activity
Identification of contaminated sites (Annex A, B, and C) and remediation in an environmentally sound manner	<ul style="list-style-type: none"> <li>▪ Analyze the basic issues that precede the development of the legal framework for management of contaminated areas:</li> <li>▪ Defining the contaminated area;</li> <li>▪ Defining framework of responsibilities;</li> <li>▪ Institutional control;</li> <li>▪ Public involvement and risk communication;</li> <li>▪ Financing remediation projects</li> <li>▪ Create new or update existing legislation on environmental protection and waste management that defines the management of contaminated sites</li> <li>▪ Carry out employee training in institutions responsible for managing contaminated sites</li> <li>▪ Carry out a preliminary survey of potential sites contaminated with POPs</li> <li>▪ Establish temporary registers of contaminated areas</li> <li>▪ Establish official registers of contaminated areas</li> <li>▪ Define technical guidelines for remediation of contaminated sites</li> <li>▪ Carry out detailed survey of sites contaminated with POPs</li> <li>▪ Prioritize areas contaminated with POPs and develop the list of priorities for remediation</li> <li>▪ Develop plans for rehabilitation and remediation of sites contaminated with POPs</li> <li>▪ Rehabilitate priority sites contaminated with POPs</li> <li>▪ Monitor the effects of rehabilitation</li> </ul>
Facilitation or exchange of information and stakeholder involvement	<ul style="list-style-type: none"> <li>▪ Ensure mechanism of exchange of information about POPs with National Focal Point</li> <li>▪ Oblige institutions to collect, exchange information and send them to the database at the entity, BD and BiH level. This includes the development of Procedure for reporting on POPs to the National Focal Point, which needs to include the following information: <ul style="list-style-type: none"> <li>– The period for data submission</li> <li>– The content and the form of the submission of data sheet</li> <li>– A communication scheme with defined contact persons from each institution</li> </ul> </li> <li>▪ Develop a procedure for exchange of information between the entity ministries and BD Government</li> <li>▪ Improve the system for exchange of information between civil society, government and institutions that are designated as competent and responsible for the implementation of the Stockholm Convention, monitoring of unintentionally produced POPs, and assessment of their impact on health and the environment</li> <li>▪ Collect, update and process data sent by the competent authorities at entity and BD levels, and deliver them to the Convention Secretariat within the reporting obligations, and correspond otherwise with the Secretariat</li> </ul>



Action Plan /Strategy	Activity
Public awareness, information and public education (Article 10)	<ul style="list-style-type: none"> <li>▪ Prepare a detailed plan to inform the public about the impacts of POPs, which will define specific programs to raise awareness and educate the public, and which will include, not limited to:</li> <li>▪ the types of programs for different stakeholders (general public, vulnerable groups, workers, educators, NGOs, persons responsible for POPs issues within the competent institutions, persons dealing with POPs management and management of POPs containing waste, etc.),</li> <li>▪ the guidelines for education and training,</li> <li>▪ the guidelines for materials to be prepared,</li> <li>▪ the number of programs to be organized,</li> <li>▪ the expected results of the conducted programs.</li> <li>▪ Implement programs to raise awareness and educate the public (described above under the “develop effective instruments for information on POPs chemicals”): organization of seminars and workshops for the sound management of POPs chemicals at various POPs groups for capacity-building of industry, administration, executive, legislative and judicial authorities and other stakeholders, including the preparation of educational materials</li> <li>▪ Organize periodic meetings and workshops inviting citizens to participate and where qualified persons would talk about POPs: what they are, where to find them, how dangerous they are, the latest information about POPs in BiH, sources of POPs, etc. Such events and workshops should be organized in an attractive and interesting manner, with presentations which should later be published through public networks. The invitations should be distributed through advertisements, billboards and flyers. Such events should be organized on the whole territory of BiH, and rural areas should not be neglected</li> <li>▪ Prepare and distribute information materials on POPs chemicals for different population groups (children, youth, the general public, etc.)</li> <li>▪ Prepare and distribute a manual for professional and technical persons on the identification and safe handling and management of hazardous waste containing POPs chemicals</li> <li>▪ Develop and implement programs for further education of teachers for Nature and the Society for the lower elementary grades, and courses of Biology and Chemistry for higher grades of elementary school and secondary school, whereby they would be introduced to the public health problem of POPs substances and their impact on the environment, and motivate students and direct them towards understanding the principles of sustainable development, the reduction of waste production (especially those containing POPs) and generally caring for the environment. Education programs should be tailored to the level of students' knowledge to which teachers need to convey this knowledge</li> <li>▪ Launch programs whereby secondary school students would be introduced, through chemistry and biology and other courses (depending on concentration), related to POPs, their chemical properties, sources and harmful effects on health and the environment</li> <li>▪ Develop learning programs at the level of university specialization that would represent a form of lifelong learning and a way of acquiring additional qualifications for persons who are members of previously identified target groups</li> <li>▪ Organize periodic public surveys on awareness of the effects of POPs for the purpose of public opinion polls and level of public awareness</li> <li>▪ Include questions about POPs chemicals in the official educational programs of formal university education under 1<sup>st</sup> cycle: the studies related to environmental protection (concentration at natural sciences schools, technology, ecology, ...) introduce systematic and detailed introduction to POPs: structure, obtaining, identification, impact on health and the environment through courses related to chemistry and elective courses</li> <li>▪ Prepare and implement interdisciplinary 2<sup>nd</sup> and 3<sup>rd</sup> cycle studies that address environmental issues, public health issues and contamination of food, water, biomes and POPs; scholarships for students of the 3<sup>rd</sup> cycle related to POPs</li> <li>▪ Nominate an institution at the state level that would be responsible for the collection, classification and disclosure of information related to POPs, primarily monitoring results. Develop a precisely defined procedure for obtaining relevant information from all institutions and bodies involved in the activity related to POPs</li> <li>▪ Establish and regularly update the website where the previously nominated institutions published all relevant information related to the Stockholm Convention and POPs as such, and the situation related to POPs chemicals in BiH</li> <li>▪ Publish: <ul style="list-style-type: none"> <li>▪ National Implementation Plan for the Stockholm Convention</li> <li>▪ Online Information on POPs chemicals, as well as information on the obligations of BiH arising from the Stockholm Convention</li> <li>▪ Information concerning the collection and disposal of waste containing POPs chemicals</li> <li>▪ Information about the Aarhus Convention and the Right of Access to Information, Public Participation in Decision-making and access to justice in environmental matters</li> </ul> </li> <li>▪ Public TV stations: broadcasting educational and scientific shows intended for children in prime time on POPs substances (shows can be taken from foreign channels, but also recorded with local experts)</li> <li>▪ Publish articles on “prime” locations (front page) in daily newspapers (Oslobodjenje, Dnevni Avaz, Nezavisne Novine, Glas Srpske, ...) and web portals on POPs and the latest discoveries and places where POPs were found in BiH</li> </ul>

Action Plan /Strategy	Activity
Effectiveness evaluation (Article 16)	<ul style="list-style-type: none"> <li>▪ In accordance with the Stockholm Convention</li> </ul>
Reporting	<ul style="list-style-type: none"> <li>▪ In accordance with the Stockholm Convention</li> </ul>
Research, development and monitoring (Article 11)	<ul style="list-style-type: none"> <li>▪ Adopt missing and update existing normative acts relating to chemicals in general and POPs substances in particular: <ul style="list-style-type: none"> <li>– Adopt laws on chemicals in the FBiH and the BD;</li> <li>– Determine the maximum allowable concentration of POPs substances in the air, drinking water, surface water, food, living organisms, soil and sediment;</li> <li>– Determine the maximum allowable concentration of POPs in waste water, waste, soil and sediment;</li> <li>– Adopt relevant EU legislation related to the monitoring of POPs in food, drinking water, living organisms, water, soil and sediment</li> </ul> </li> <li>▪ Nominate institutions responsible for implementation of monitoring biomes in the Entities and BD</li> <li>▪ Equipment, facilities and personnel necessary to perform given tasks are to be ensured in the institutions appointed for the implementation of monitoring</li> <li>▪ Establish a plan for monitoring substances in the list of the Stockholm Convention in food, drinking water, environment, biome and places of waste disposal</li> <li>▪ Conduct staff training related to quality assurance and implementation of good laboratory practice system</li> <li>▪ The institutions nominated to carry out monitoring should prepare documentation relating to the quality and monitoring requirements for POPs. This documentation should include the standard operating procedures for sampling, analysis, interpretation and reporting of results</li> <li>▪ Provide funds for certification and accreditation of nominated laboratories</li> <li>▪ Identify priority knowledge, skills and competencies that institutions responsible and accountable for monitoring of POPs should further adopt in order to be able to fully answer the objectives and goals of strengthening the capacity for timely and systematic monitoring of POPs in the air, water, food, living organisms and soil/land</li> <li>▪ Based on previously established priorities, define project objectives that will enable the adoption of the necessary knowledge, skills and competencies, and to define criteria based on which will be selected scientific research and/or higher education institutions which will be entrusted with the implementation of projects</li> <li>▪ Provide project funding for knowledge, skills and competences required for the evaluation of monitoring results and risk assessment of the impacts of POPs on human health and the environment</li> <li>▪ Establish mechanisms of transfer of knowledge, skills and competences acquired through the implementation of approved projects, and implement these transfers in the institutions responsible for the implementation of POPs monitoring, and evaluation of research results</li> <li>▪ Identify POPs and types of biological materials to be monitored, and develop a monitoring plan</li> <li>▪ Establish a mechanism for coordination between the institutions responsible for collecting, sorting and dissemination of data on monitoring results, release of POPs and the environment and the disposal of waste containing POPs, and collect, sort, and make existing data available</li> <li>▪ Establish a plan for monitoring all of POPs substances in food and working environment, in accordance with the EU regulations</li> <li>▪ Implement monitoring programs in food and working environment that will include all POPs substances and ensure dissemination of the results, in accordance with EU regulations</li> <li>▪ On the basis of information collected in previous research on potentially contaminated locations with POPs, determine a preliminary list of these areas in BiH</li> <li>▪ In the case of determining the concentration of POPs over permitted values on locations, develop a plan of remediation and continuous monitoring, which will be used on the identified locations to monitor the effects of the measures</li> <li>▪ Develop a monitoring program of unintentionally produced POPs from industry</li> <li>▪ Assess the impact of contaminated site on human health, especially vulnerable groups, and on the environment in the vicinity of the site defined on the basis of practice of other signatories of the Stockholm Convention</li> <li>▪ Based on the risk assessment, determine the most vulnerable groups of the population and prepare action plan to reduce the impacts of POPs (primarily through food) on the targeted population, but also on the BiH population as a whole</li> <li>▪ Nominate institutions and implement programs to reduce the impact and risk of exposure of target population to POPs substances</li> <li>▪ Establish periodic monitoring program to track the effectiveness of the proposed activities and implement this monitoring</li> </ul>

# 1 INTRODUCTION

- 1.1 GOALS AND PROVISIONS OF THE STOCKHOLM CONVENTION
- 1.2 PROCESS OF DEVELOPMENT OF THE NATIONAL IMPLEMENTATION PLAN IN BOSNIA AND HERZEGOVINA



The Project “Enabling Activities to Facilitate Early Action on the Implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) in Bosnia and Herzegovina” is funded by the Global Environment Facility (GEF) and implemented by the United Nations Industrial Development Organization (UNIDO) in collaboration with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina (MoFTER). The respective institutions from the Federation of Bosnia and Herzegovina (FBiH), Republika Srpska (RS) and Brcko District of Bosnia and Herzegovina (BD) are involved in the Project implementation.

For the realization of the project (which includes the analysis of the legal and regulatory framework, development of preliminary inventory of persistent organic pollutants, organizing workshops, trainings and meetings, preparation of action plans and the National Implementation Plan) is responsible the National Executive Agency (NEA) which consists of the consortium of Enova Ltd. Sarajevo and the Institute of Protection and Ecology of Republika Srpska, Banja Luka. NEA has been selected through an international competition by UNIDO, in cooperation with MoFTER.

The general objective of the project “Enabling Activities to Facilitate Early Action on the Implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) in Bosnia and Herzegovina” (“the Project”) is to strengthen the capacity of Bosnia and Herzegovina (BiH) to manage persistent organic pollutants (POPs) – chemicals regulated under the Stockholm Convention, strengthen the ability to develop the National Implementation Plan (NIP) for the implementation of the Convention and to help BiH in developing and submitting the NIP to the Secretariat of the Convention.

POPs are organic non-biodegradable chemicals that are released into the environment as a result of human activities, primarily industry. Some of these substances are unwanted by-products of industrial processes or combustion. POPs are organochlorine compounds that include all organic compounds which contain one or more chlorine atoms.

POPs are characterized by<sup>4</sup>:

- Persistence – the ability to resist chemical, photolytic and biological degradation in various media (air, water, sediments, and organisms for months and even decades);
- Bio-accumulation - the ability to accumulate in living tissues at levels higher than those in the surrounding environment. POPs are organic compounds with high lipophilicity (dissolved in fatty tissues) which allows them to bio-accumulate inside living organisms;
- Potential for long range transport – the potential to travel great distances from the source of release through various media (air, water, and migratory species). These substances are highly stable and circulate globally through a process called “the grasshopper effect”.

POPs are highly toxic and cause an entire range of adverse effects in humans and animals: cancer, allergies and hypersensitivity, damage to the central and peripheral nervous system, reproductive disorders and immune system disorders<sup>5</sup>.

Based on conducted studies<sup>6</sup> which showed the damaging effects of POPs, international organizations such as the UN, and its specialized organizations such as UNEP and UNIDO etc. have started to take measures to eliminate or reduce or limit the use and release of POPs into the environment with the aim of protecting nature and human health.

4 Preliminary guidance paper on bioaccumulation evaluation UNEP/POPS/POPRC.3/20/Annex VI (Source: www.pops.int)

5 Ridding the world of POPs: A guide to the Stockholm Convention on Persistent Organic Pollutants (United Nations Environment Programme, August 2010.)

6 Ritter L; Solomon KR, Forget J, Stemeroff M, O’Leary C. „Persistent Organic Pollutants, An Assessment Report on: DDT-Aldrin-Dieldrin-Endrin-Cklordane-Heptacklor-Hexacklorobenzene-Mirex-Toxaphene-PCBs-Dioxins and Furans“, UNEP (Accessed on 28 January 2014)

## 1.1 GOALS AND PROVISIONS OF THE STOCKHOLM CONVENTION

The Stockholm Convention on Persistent Organic Pollutants was adopted on 22 May 2001 and it entered into force on 17 May 2004. So far, 179 countries are Parties to the Convention (status in November 2013). Convention Secretariat is in Geneva, Switzerland.

Bosnia and Herzegovina ratified the Stockholm Convention on POPs on 30 March 2010 and committed to meeting the requirements of the Convention.

The main objective of the Convention is to take measures for the elimination or restriction or prevention of the production, import, export and use of all manufactured POPs (pesticides and industry chemicals) and the continuous reduction to minimize the occurrence of these pollutants in the environment, and the elimination of emissions of unintentionally produced POPs (such as dioxins, furans, as well as hexachlorobenzene and PCBs that occur in industrial processes).

At first, the Convention regulated 12 chemicals, namely: aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, polychlorinated biphenyls, DDT, dioxins and furans (polychlorinated dibenzodioxins and polychlorinated dibenzofurans). However, after the 4<sup>th</sup> Conference of Parties (COP) in 2009, the Convention text was amended, to include the nine new POPs (chlordecone, hexabromobiphenyl, alpha hexachlorocyclohexane and beta hexachlorocyclohexane, lindane, tetrabromodiphenyl and pentabromodiphenyl, hexabromodiphenyl and heptabromodiphenyl, perfluorooctane sulfonic acid and its salts and perfluorooctanesulfonyl fluoride). The Amendment came into force in on 26 August 2010.

After the 5<sup>th</sup> Conference of Parties in 2011, the member stated agreed on adding technical endosulfan and appropriate isomers to the list of chemicals in Annex A of the Convention, removal with specific exemptions. With the entry into force of this amendment, in 2012, endosulfan became 22<sup>nd</sup> persistent organic pollutant added to the list of chemicals of the Stockholm Convention.

List of chemicals regulated by the Stockholm Convention are shown in Table 1 and the table is an integral part of the Convention text. It gives an overview acceptable purpose or specific exemptions for chemicals that Party to this Convention must in writing notify the Secretariat. In the event that the Party receives approval from the Secretariat, the duration of a specific exemption is up to five years for each chemical that the Party obtained approval from the Secretariat.

Annex of the Convention which specifies POPs chemicals	Pesticide	Industrial chemical	Unintentional production	Acceptable purpose or specific exemption
Annex A: Elimination				Specific exemption
Aldrin	X			Production: None Use: Local ectoparasiticide Insecticide
c-Hexa/PentaBDE		X		Production: None Use: Articles in accordance with the provisions of Part IV of this Annex
c-Tetra/PentaBDE		X		Production: None Use: Articles in accordance with the provisions of Part V of this Annex
Dieldrin	X			Production: None Use: In agricultural operations
Endrin	X			Production: None Use: None
Hexabromobiphenyl		X		Production: None Use: None
Hexachlorobenzene (HCB) (also listed in Annex C)	X	X	X	Production: As allowed for the Parties listed in the Register Use: Intermediate Solvent in pesticide Closed system site limited intermediate

Table 1:  
Chemicals that are on  
the list of the Stockholm  
Convention

Annex of the Convention which specifies POPs chemicals	Pesticide	Industrial chemical	Unintentional production	Acceptable purpose or specific exemption
Heptachlor	X			<i>Production:</i> None <i>Use:</i> Termiticide Termiticide in structures of houses Termiticide (subterranean) Wood treatment In use in underground cable boxes
Chlordane	X			<i>Production:</i> As allowed for the Parties listed in the Register <i>Use:</i> Local ectoparasiticide Insecticide Termiticide Termiticide in buildings and dams Termiticide in roads Additive in plywood adhesives
Chlordecone	X			<i>Production:</i> None <i>Use:</i> None
Mirex	X			<i>Production:</i> As allowed for the Parties listed in the Register <i>Use:</i> Termiticide
Polychlorinated biphenyls (PCB) (also listed in Annex C)		X	X	<i>Production:</i> None <i>Use:</i> Articles in use in accordance with the provisions of Part II of this Annex
Toxaphene	X			<i>Production:</i> None <i>Use:</i> None
$\alpha$ -hexachlorocyclohexane	X			<i>Production:</i> None <i>Use:</i> None
$\beta$ -hexachlorocyclohexane	X			<i>Production:</i> None <i>Use:</i> None
$\gamma$ -hexachlorocyclohexane (Lindane)	X			<i>Production:</i> None <i>Use:</i> Human health pharmaceutical for control of head lice and scabies as second line treatment
Pentachlorobenzene (PeCB) (also listed in Annex C)	X	X	X	<i>Production:</i> None <i>Use:</i> None
Technical endosulfan and its related isomers	X			<i>Production:</i> As allowed for the Parties listed in the Register <sup>7</sup> <i>Use:</i> Crop-pest complexes as listed in accordance with the provisions of part VI of this Annex
Annex B: Restriction				Acceptable purpose or specific exemption
DDT	X			<i>Production:</i> Acceptable purpose: Disease vector control use in accordance with Part II of this Annex Specific exemption: Intermediate in production of dicofol Intermediate <i>Use:</i> Acceptable purpose: Disease vector control in accordance with Part II of this Annex Specific exemption: Production of dicofol Intermediate

<sup>7</sup> In accordance with Article 4 of the Convention, register is the list of the Convention Parties who have been granted a special exemption for certain chemicals listed in Annex A or B of the Convention. Register is maintained by the Secretariat of the Convention and available to the public.

Annex of the Convention which specifies POPs chemicals	Pesticide	Industrial chemical	Unintentional production	Acceptable purpose or specific exemption
Perfluorooctane sulfonic acid (PFOS) its salts and perfluorooctane sulfonyl fluoride (PFOS-F)		X		<p><i>Production:</i> Acceptable purpose: In accordance with Part III of this Annex, production of other chemicals to be used solely for the uses below. Production for uses listed below. Specific exemption: As allowed for Parties listed in the Register.</p> <p><i>Use:</i> Acceptable purpose: In accordance with Part III of this Annex for the following acceptable purposes, or as an intermediate in the production of chemicals with the following acceptable purposes:</p> <ul style="list-style-type: none"> <li>▪ Photo-imaging</li> <li>▪ Photo-resist and anti-reflective coatings for semi-conductors</li> <li>▪ Etching agent for compound semiconductors and ceramic filters</li> <li>▪ Aviation hydraulic fluids</li> <li>▪ Metal plating (hard metal plating) only in closed-loop systems</li> <li>▪ Certain medical devices (such as ethylene tetrafluoroethylene copolymer (ETFE) layers and radio-opaque ETFE production, in-vitro diagnostic medical devices, and CCD colour filters)</li> <li>▪ Fire-fighting foam</li> <li>▪ Insect baits for control of leaf-cutting ants from <i>Atta spp.</i> and <i>Acromyrmex spp.</i></li> </ul> <p>Specific exemption: For the following specific uses, or as an intermediate in the production of chemicals with the following specific uses:</p> <ul style="list-style-type: none"> <li>▪ Photo masks in the semiconductor and liquid crystal display (LCD) industries</li> <li>▪ Metal plating (hard metal plating)</li> <li>▪ Metal plating (decorative plating)</li> <li>▪ Electric and electronic parts for some colour printers and colour copy machines</li> <li>▪ Insecticides for control of red imported fire ants and termites</li> <li>▪ Chemically driven oil production</li> <li>▪ Carpets</li> <li>▪ Leather and apparel</li> <li>▪ Textiles and upholstery</li> <li>▪ Paper and packaging</li> <li>▪ Coatings and coating additives</li> <li>▪ Rubber and plastics</li> </ul>
<b>Annex C: Unintentional production</b>				
Pentachlorobenzene (PeCB) (also listed in Annex A)	X	X	X	-
Hexachlorobenzene (HCB) (also listed in Annex A)	X	X	X	-
Polychlorinated biphenyls (PCB) (also listed in Annex A)		X	X	-
Polychlorinated dibenzo-p-dioxins (PCDD)			X	-
Polychlorinated dibenzofurans (PCDF)			X	-

In accordance with the main provisions specified in the Stockholm Convention, all Parties are obliged to:

- Prohibit production, use, import and export of POPs listed in Annex A, as well as restrict production and use of chemicals listed in Annex B (Article 3 of the Convention);
- Prevent production and use of new pesticides or new industrial chemicals which, taking into consideration the criteria defined (persistence, bio-accumulation, potential for long-range environmental transport, adverse effects) exhibit the characteristics of persistent organic pollutants (Article 3 of the Convention);
- Take appropriate measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimization and, where feasible, ultimate elimination (Article 5 of the Convention);
- Develop appropriate strategies for identification of stockpiles, products and articles in use and identify stockpiles consisting of or containing chemicals listed either in Annex A or Annex B, as well as products and articles in use and wastes consisting of, containing or contaminated with chemicals listed in Annex A, B or C (Article 6 of the Convention);
- Manage stockpiles, as appropriate, in a safe, efficient and environmentally sound manner until they become waste (Article 6 of the Convention);
- Take appropriate measures so that PCB wastes, including products and articles upon becoming wastes are handled, collected, transported and stored in an environmentally sound manner (Article 6 of the Convention);
- Dispose of waste containing PCBs in an environmentally sound manner taking into account international rules, standards and recommendations. It is necessary to ensure that waste is disposed of in such a way that the persistent organic pollutant content is destroyed or irreversibly transformed so that they do not exhibit the characteristics of persistent organic pollutants or otherwise disposed of in an environmentally sound manner when destruction or irreversible transformation does not represent the environmentally preferable option or the persistent organic pollutant content is low (Article 6 of the Convention);
- Take appropriate measures to ensure that POPs waste is not subjected to disposal operations that may lead to recovery, recycling, reclamation, direct reuse or alternative uses of persistent organic pollutants (Article 6 of the Convention);
- Develop appropriate strategies for identifying contaminated sites and conduct appropriate remediation in an environmentally sound manner (Article 6 of the Convention);
- Develop a National Implementation Plan, consulting all stakeholders (Article 7 of the Convention);
- Carry out obligatory reporting – submit to the Secretariat of the Convention statistical data on total production, import and export of each of the chemicals listed in Annex A and Annex B (Article 15 of the Convention);
- Carry out obligatory evaluation of Convention's effectiveness in order to provide comparable monitoring data on the presence of the chemicals listed in Annexes A, B and C as well as their regional and global environmental transport (Article 16 of the Convention).

The Global Environment Facility (GEF) is the current financial mechanism to support the Convention. The GEF was established in 1991 as a pilot program of the World Bank to assist in the protection of the global environment and promote sustainable environmental development. The United Nations Environment Programme (UNEP) is the executive agency of the GEF. UNEP with the Secretariat of the GEF is working to develop a network for access to various sources of financing and technical assistance related to the management of POPs.

BiH ratified the Stockholm Convention on 30 May 2010 and committed to meeting the requirements of the Convention:

- elimination of dangerous POPs (12 most dangerous) from use and transition to the use of non-hazardous chemicals;
- cleaning, removal and destruction of old stockpiles and equipment containing POPs;



- taking appropriate actions, such as reducing emissions related to other POPs listed in the Convention;
- reporting under the Convention on POPs.

In accordance with Article 7 Stockholm Convention, each Party must prepare a plan for the implementation of its obligations under this Convention (NIP), within two years of the date on which this Convention enters into force.

So far, 153 Parties to the Convention prepared and submitted to the Secretariat their first NIP, and 16 submitted the second NIP, or revision of the first NIP which considered the new chemicals from the list of the Convention. Given that BiH has still not prepared and submitted NIP, as part of the first NIP all 22 chemicals listed in the Stockholm Convention will be considered.

NIP represents a detailed review of the measures that will be necessary to undertake in BiH, responsibility for the measures and the resources needed for their implementation in order to comply with the provisions of the Convention.

## 1.2 PROCESS OF DEVELOPMENT OF THE NATIONAL IMPLEMENTATION PLAN IN BOSNIA AND HERZEGOVINA

National Implementation Plan for the Stockholm Convention in BiH is developed in accordance with “*Guidance for developing a national implementation plan for the Stockholm Convention on POPs*” (SSC, UNEP, UNIDO, UNITAR, 2012).

In line with the guidelines, the implementation of the project was carried out in five phases:

- PHASE I: Project organization and coordination;
- PHASE II: Development of the POPs inventory and assessment of the state infrastructure and the capacity to manage POPs;
- PHASE III: Priority assessment and objectives setting;
- PHASE IV: Development of action plans and strategies as integral parts of the NIP
- PHASE V: NIP endorsement by relevant stakeholders.

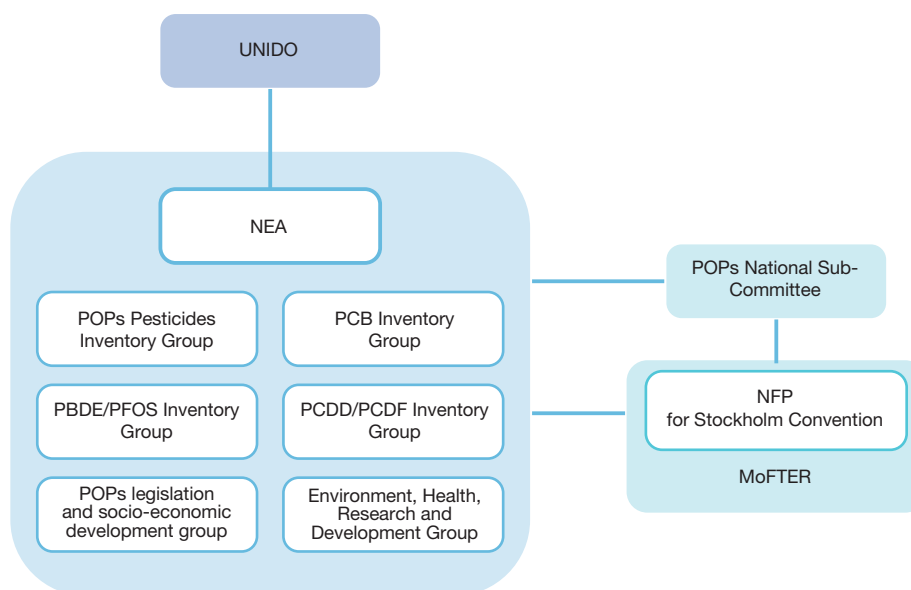
### **Phase I: Project organization and coordination**

The Project “Enabling Activities to Facilitate Early Action on the Implementation of the Stockholm Convention on Persistent Organic Pollutants (POPs) in Bosnia and Herzegovina” is implemented by UNIDO in collaboration with the Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina. The respective institutions from the Federation of Bosnia and Herzegovina, Republika Srpska and Brcko District of Bosnia and Herzegovina are involved in the Project implementation.

Key participants in the project are:

- The Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina which is, in accordance with the Conclusions of the Council of Ministers “On the Institutional and Organizational Infrastructure for Managing the Environment and GEF programs in BiH” issued at its 66<sup>th</sup> session held on 16 May 2002, appointed as the National Focal Point for coordination of cooperation with international structures and bodies of the Stockholm Convention;
- The National Executive Agency (NEA) comprised of the consortium of consultants Enova d.o.o. Sarajevo and Institute of Protection and Ecology of RS, Banja Luka, responsible for the realization of the Project (which includes the analysis of the legal and regulatory framework, development of preliminary inventory of persistent organic pollutants, organizing workshops, trainings and meetings, preparation of action plans and the National Implementation Plan);
- POPs National Sub-Committee.

Figure 1:  
Project Organization  
Structure



The Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina is in charge of supervision of all daily activities undertaken by NEA, including the drafting of the NIP. Its responsibilities, through the NFP, include approaching various governmental and NGO bodies in BiH, FBiH, RS and BD with official requests for nomination of members of the POPs National Sub-Committee (PNSC), informing the UNIDO on the establishment of the PNSC, officially requesting data from various governmental bodies and official circulation of the completed NIP to relevant governmental institutions for endorsement. The Ministry submits the adopted NIP to the Conference of Parties (COP) of the Stockholm Convention through its' Secretariat in Geneva.

NEA is responsible for implementing the Project on a daily basis.

POPs National Sub-Committee is a significant participant of this project. Its responsibility is to provide project oversight and advice and monitoring of the project activities. Since the implementation of the Project by all authorities in BiH was approved in December 2013, then the Project Steering Committee was officially formed (Annex 1 provides a list of PNSC members).

During the first phase of the Project, NEA identified the key Project stakeholders in accordance with the Terms of Reference. In cooperation with MoFTER, NEA selected the participants on the basis of their role in the management of chemicals in BiH among decision makers (institutions at state, entity and BD level), industries whose processes produce POPs chemicals in the form of gases, waste water and waste, representatives of NGOs and independent experts. The selection was made with the aim to obtain information, and ensure contribution of independent experts and decision makers in addressing the issue of POPs substances.

The first activity within the framework of the project was the Inception Workshop organized by NEA, held on March 28, 2013 in Sarajevo. The objective of the workshop was to provide information to the key stakeholders and introduce the Project, as well as raise awareness among these stakeholders on POPs chemicals. During the workshop, interest groups were informed of their obligations and the steps required for the implementation of the Stockholm Convention on POPs in Bosnia and Herzegovina.

The main objective of the Inception Workshop was to ensure cooperation between national stakeholders, which was largely achieved through their commitment to the participation in the Project and active role in the discussion. The workshop was attended by a total of 63 participants from governmental institutions, organizations and companies (Annex 3), and UNIDO representative.

### Phase II: Development of the POPs inventory and assessment of the state infrastructure and the capacity to manage POPs

At the beginning of the second phase of the Project, NEA organized a Training Workshop for developing the POPs inventory in BiH, held in Sarajevo, in the period May 14 – 16, 2013, with the aim of creating conditions for the development of a proper inventory of POPs chemicals in

BiH, informing participants about the procedures of developing the POPs inventory, including all POPs chemicals regulated by the Convention. For that purpose, UNIDO has engaged the following experts to conduct the training, in consultation with NFP and NEA:

- Prof. Ivan Holoubek, RECETOX, Masaryk University, Faculty of Science, Brno, Czech Republic
- Alexander Mickovski, Ministry of Environment and Physical Planning, Skopje, Macedonia
- Maren Mellendorf, representative of UNIDO

The participants invited to the training were identified as national experts and other individuals selected by the NEA and MOFTER as those who were able to contribute to the inventory process (Annex 3), with a total of 30 participants (Annex 2). For that purpose, NEA formed a total of six inventory groups and identified their tasks:

- **POPs Pesticides Inventory Group:** this Group's task is to conduct a basic inventory of import, export, trade, use, distribution, obsolete stocks and contaminated sites of Annex A, Part I and Annex B ;
- **Polychlorinated biphenyls inventory group:** this Group's task is to conduct a base inventory of import, export, trade, use, distribution, obsolete stocks and contaminated sites of Annex A, Part II (PCBs);
- **Group for inventory of emissions from the unintentional production of PCDDs/PCDFs, HCB and PCBs:** this Group's task is to conduct a basic inventory of Annex C POPs (Dioxins and Furans, PCBs and HCB) and draft a review of POPs contaminated areas;
- **Polybrominated diphenyl ether and perfluorooctanesulfonate inventory group:** this Group's task is to conduct a basic inventory of polybrominated diphenyl Ethers (PBDEs) and perfluorooctanesulfonate (PFOS);
- **Group for environment, human health and research and development:** this Group's task is to identify potential problem issues caused by POPs related to human health and the environment and will draft a report on monitoring and research capabilities related to POPs;
- **Group for POPs legislation and socio-economic development:** this Group's task is to assess the existing legislation in the country, infrastructure, policy and regulatory framework and analyze missing legislation pertaining to POPs in BiH. The group will also assess capacities for monitoring, implementation, the current level of awareness and education amongst targeted groups.

This workshop represented the beginning of the second phase of the Project implementation.

The POPs inventory groups have started the process of collecting data after the training workshop in May 2013 and have approached government institutions and organizations to obtain data, in accordance with their responsibilities related to the management of chemicals in BiH (Annex 4).

In addition to government institutions, the inventory groups have addressed different organizations and companies from various sectors with a request for the provision of data in the period May - November 2013:

- Organizations:
  - Hospitals and healthcare facilities,
  - Civil protection administrations,
  - Fire brigades;
- Private and public companies from the following sectors:
  - The metallurgical industry,
  - Electricity Supply - three producers and distributors of electricity in the country,
  - Supply of natural gas,
  - Extraction of minerals - mining,
  - Importers and exporters of pesticides, electronics, consumer goods,
  - Landfills,
  - Producers of mineral products,
  - Manufacturers of chemicals and consumer goods.

Table 2 indicates the amount of inquiries that the inventory groups sent to institutions, organizations and companies during the inventory period.

*Table 2:  
Overview of the amount  
data sent and the  
data collected during  
the inventory period  
May - November 2013  
from institutions,  
organizations and  
companies*

No.	Inventory	Total no. requests for data sent by NEA	Total no. of data received	Data Collection Success Rate (%)
1.	Inventory of POPs Pesticides	39	16	38
2.	Inventory of Polychlorinated Biphenyls (PCBs)	316*	41*	13
3.	Inventory of Polybrominated Retardants (PBDEs) and Perfluorooctanesulfonate (PFOS)	781*	89*	11
4.	Inventory of Dioxins (PCDDs) and Furans (PCDFs)	470*	66*	14
5.	Legal, Institutional and Socio-Economic Inventory	10	5	50
6.	Assessment of POPs Effects on Human Health and Environment	12	9	75
	<b>TOTAL</b>	<b>1,628</b>	<b>226</b>	<b>33</b>

\* Questionnaires only

The first meeting of the POPs inventory groups, organized by NEA, was held on 09 November 2013 in Vlačić, with the aim of presenting the preliminary results of inventories of all working groups for the POPs inventory, the discussions on these results and the considerations to improve the quality of inventory. This meeting was attended by 18 participants (Annex 3).

During September and October 2013, MoFTER in cooperation with NEA approached with urgent letters institutions, organizations, and companies that did not respond to the first request between May and August 2013 which asked for speeding up the process of data collection, and their delivery to NEA.

The development of the inventory of POPs chemicals was carried out in the period May-December 2013. During December 2013, NEA has sent a working version of a preliminary inventory to international experts who were involved in the workshop training (prof. Ivan Holoubek, Alexander Mickovski, and representatives of UNIDO) to revise certain chapters of the preliminary inventory and provide their comments and suggestions for their improvement. After consultations with international and local experts, NEA has prepared a Draft Report on the Preliminary Inventory of POPs in BiH.

With the aim of presenting the results of the preliminary inventory to the interest groups, NEA organized a one-day workshop in Banja Luka on February 18, 2014, which was attended by participants who were identified by NEA as stakeholders in the first phase of the project and were engaged in Project activities since the beginning (Annex 3) and the representative of UNIDO. In line with the comments received at and after the Workshop, NEA finalized the Report on the Preliminary Inventory of POPs in BiH.

As part of the Report on the Preliminary Inventory of POPs in BiH, the POPs inventory groups formulated the conclusions and recommendations based on the inventory of POPs in BiH, which served as a basis for defining priorities and objectives in the framework of the development of the National Implementation Plan for the Stockholm Convention in BiH.

### **Phase III: Priority assessment and objectives setting**

Based on the conclusions and recommendations of the POPs working groups formulated based on the results of the preliminary inventory of POPs in BiH, and the comments and suggestions received after the Preliminary Inventory Workshop, NEA has prepared a proposal of priority areas for addressing the management of POPs chemicals in BiH and the criteria for ranking the proposed priority areas. These priority areas, as well as the criteria for ranking were the subject of discussions and were agreed upon at the Priority Validation Workshop, organized by NEA and held in Sarajevo on April 24, 2014, which was attended stakeholders identified by NEA in the earlier phases of the Project (Annex 3), and the representative of UNIDO.

The current Project activities, the workshop objectives based on determination of priority areas, the criteria for their evaluation as well as ranking of priority actions were presented during the workshop. The Workshop participants had the opportunity to directly comment on the proposed priority areas and the criteria for their ranking, or propose new and, finally, perform priority ranking for the purpose of creating NIP BiH through a proactive approach and group discussion.

The criteria against which the Workshop participants ranked the priority areas are the following:

- Relevance to reducing negative impacts on human health
- Relevance to reduce the negative environmental impacts
- Link with the existing strategies and plans in the field of environmental protection and other related fields, as well as EU integration
- Urgency for resolving the problems, and the characteristic of a precondition
- Availability of adequate alternatives
- Availability of funding

Each priority area was evaluated, according to these criteria, using the following grades:

- 12        Very high priority
- 9         High priority
- 6         Moderate priority
- 4         Low priority
- 2         Very low priority
- 0         Not priority

The main outcome of the workshop were agreed priorities by all relevant stakeholders who attended the workshop, including representatives of relevant ministries, public institutions, industrial sector, universities, NGOs and other stakeholders.

#### **Phase IV: Development of action plans and strategies**

Based on the priorities agreed at the Priority Validation Workshop, NEA has prepared a draft proposal of action plans and strategies for the successful implementation of all obligations under the Stockholm Convention in BiH, which specifies measures and activities, institutions responsible for their implementation, an implementation timetable and estimated funds necessary.

The second meeting of the POPs inventory groups, organized by the NEA, was held on July 22, 2014 in Teslić. The meeting was an opportunity for members of the working groups to gain insight into proposed action plans and strategies prepared on the basis of adopted priorities and goals, discuss the proposed actions and measures, and provide suggestions for their improvement. In addition to members of the inventory groups (Annex 3), the meeting was also attended by a representative of UNIDO. According to the comments received during and after the meetings, NEA drafted action plans and submitted them to representatives of UNIDO for review and revision. All resulting comments and suggestions were incorporated into the draft NIP.

#### **Phase V: NIP endorsement by the relevant stakeholders**

NEA presented the final draft of NIP at the Final Workshop, held in Sarajevo on 27 October 2014. After incorporating comments from stakeholders presented at the Workshop, NEA has finalised the NIP document. The Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina, i.e. the National Focal Point for the Stockholm Convention has, through the PNSC members, submitted the final NIP to the relevant government bodies for approval.

Prior to sending for adoption by the Council of Ministers of Bosnia and Herzegovina, the NIP needs to be adopted by the Government of the Federation of Bosnia and Herzegovina, the Government of Republika Srpska and the Government of Brcko District. Conclusions of the Council of Ministers of Bosnia and Herzegovina on the adoption of the NIP, along with the NIP document, Bosnia and Herzegovina submits to the Secretariat of the Stockholm Convention, through diplomatic channels.



## 2 BOSNIA AND HERZEGOVINA - BASELINE

- 2.1 PROFILE OF BOSNIA AND HERZEGOVINA
- 2.2 INSTITUTIONAL AND REGULATORY FRAMEWORK IN BOSNIA AND HERZEGOVINA
- 2.3 CURRENT POPs MANAGEMENT IN BOSNIA AND HERZEGOVINA



## 2.1 PROFILE OF BOSNIA AND HERZEGOVINA

The state of BiH is regulated by the Dayton Agreement (signed December 14, 1995) and consists of three separate administrative units: the Federation of Bosnia and Herzegovina (FBiH), Republika Srpska (RS) and Brčko District (BD) of Bosnia and Herzegovina.

**Figure 2:**  
Administrative  
organisation of BiH  
according to the Dayton  
Peace Agreement



**Table 3:**  
Basic information about  
BiH

Structure	State			
Population (2013)	3,791,622			
Population density	75 residents/ km <sup>2</sup>			
Birth rate (based on 1.000 residents) (2011)	8.3			
Capital	Sarajevo			
Administrative division	Federation of BiH Administratively divided into 10 cantons, and the cantons are divided into 79 municipalities	Republika Srpska Administratively divided into 62 municipalities	Brčko District of BiH Special administrative unit - District	
Official languages	Bosnian, Croatian, Serbian			
Official currency	Convertible mark (KM)			
Official alphabets	Latin, Cyrillic			
Geographical coordinates of the endpoints	Direction			
	North	South	East	West
Latitude	45°16'30"	42°33'00"	44°03'00"	44°49'30"
Longitude	16°55'56"	18°32'24"	19°37'41"	15°44'00"
Area	51,209.2 km <sup>2</sup>			
Coastline	21.2 km			
Highest mountain	Maglić 2.386 m			
Longest river	Drina 346 km			
Largest lake	Buško Lake 55.8 km <sup>2</sup>			
Climate	Moderate continental and Mediterranean			



## 2.1.1 NATURAL CHARACTERISTICS

### 2.1.1.1 Geographical location

BiH is located in the middle of the Balkan Peninsula, between the Adriatic and Pannonian region, and is surrounded by the Republic of Croatia (931 km) on the north, northwest and south, and the Republic of Serbia (375 km) and the Republic of Montenegro (249 km) on the east, while on the south, it has a coastline of 21.2 km on the Adriatic Sea, surrounding the city of Neum.

The area of BiH is 51,209.2 km<sup>2</sup>, which is made up of 51,197 km<sup>2</sup> land surface, and 12.2 km<sup>2</sup> sea surface.

### 2.1.1.2 Terrain

BiH is a hilly and mountainous country (made up of 42% mountains, 24% hills, 29% karst area), covered by forests, with less than 8% of the area on less than 150 m altitude and an average altitude of 500 m.

Hydrographically, 75.5% of BiH belongs to the Black Sea basin, with Una, Vrbas, Drina, Bosna and Sava as the most significant tributaries, and 24.5% belongs to the Adriatic Sea basin with Neretva and Trebišnjica as the most significant tributaries.

### 2.1.1.3 Climate

There are three dominant climates in BiH, which are conditioned by the geographical location, geologic substrate, topography, the terrain being covered by plant communities and the vicinity of the Adriatic Sea:

- *moderate continental climate* in the northern part of the country with average yearly temperatures of 9 – 12 °C
- *highland continental climate* in the central parts of the country with average yearly temperatures of 5 – 11 °C
- *Mediterranean climate* in the south-western part of the country with average yearly temperatures of 13 – 16 °C

## 2.1.2 SOCIO-ECONOMIC BASELINE

### Demographic characteristics

The preliminary results of the census in BiH from 2013 are shown in Table 4. According to data from the Agency for Statistics of BiH, the average age of the population in BiH is 38.3. The largest number of residents in BiH belongs to the age group between 35 and 64 (39.5%).

Compared to the previous pre-war census from 1991, when there were 4,377,000 residents, today there are over half a million less people in BiH.

The majority of the population in BiH lives in larger urban centres (Sarajevo, Tuzla, Banja Luka etc.) which are also the most developed areas.

Census results	BIH	FBIH	RS	BD
Number of people	3,791,622	2,371,603	1,326,991	93,028
Number of households	1,163,387	721,199	414,847	27,341
Average number of household members	3.26	3.29	3.20	3.40

*Table 4:  
Overview of the  
preliminary results of the  
census in BiH<sup>8</sup>*

BiH is characterised by a low fertility rate, and according to the estimate of the Agency for Statistics of BiH, the average total fertility rate for the period of 2001 – 2011 is 1.25.

<sup>8</sup> Agency for Statistics of BiH, Preliminary results of the Census on population, households and apartments in Bosnia and Herzegovina 2013, Sarajevo, 05.11.2013.

## Employment rate and education

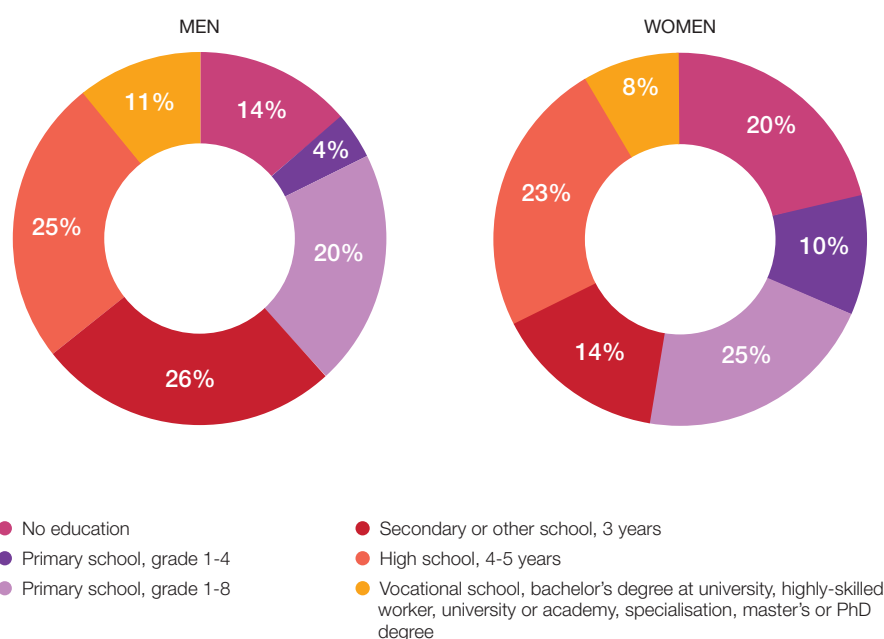
According to standard ILO classifications, Table 5 shows employment-related data by the year.

**Table 5:**  
Overview of data on the  
BiH workforce from 2006  
until 2014<sup>9</sup>

	2006	2007	2008	2009	2010	2011	2012	2013
(x 1,000)								
Work-capable population	2,733	2,725	2,649	2,594	2,597	2,561	2,566	2,598
Number of those employed	811	850	850	859	843	816	814	822
Number of those unemployed	366	347	347	272	315	311	317	311
Inactive population	1,556	1,529	1,529	1,463	1,439	1,434	1,436	1,465
(%)								
Employment rate	29.7	31.2	33.6	33.1	32.5	31.9	31.7	31.6
Unemployment rate	31.1	29.0	23.4	24.1	27.2	27.6	28.0	27.5
Percentage of work-capable population	66.5	67.4	66.0	66.7	67.1	67.5	67.4	68.2

The educational structure in BiH shows that among women, the largest part of the population, as much as 25% has no education at all, while, on the other hand, there are 6% of men with no education at all (Figure 3).

**Figure 3:**  
Structure of population  
aged 6 and over based  
on the level of education  
in 2011<sup>10</sup>



### 2.1.3 POLITICAL ORGANISATION

After the referendum on independence was held on 1 March 1992, BiH gained independence from the Socialist Federal Republic of Yugoslavia (SFRY), as an internationally recognised state. It was admitted as a full member of the United Nations (UN) on 22.05.1992, as the Republic of Bosnia and Herzegovina.

The current organisation of BiH was determined on 21 November 1995 with the initialling of the General Framework Agreement for Peace in Bosnia and Herzegovina in Dayton and its signing in Paris on 14 December 1995, which confirmed the continuity of the legal existence of BiH as a state, with a modified internal structure. The Constitution of Bosnia and Herzegovina makes Annex 4 of this Agreement.

According to the Constitution of Bosnia and Herzegovina, three constituent peoples, i.e. Bosniaks, Croats and Serbs live in two entities: the Federation of BiH and Republika Srpska,

<sup>9</sup> Agency for Statistics of BiH, Survey on the workforce 2008-2013, Sarajevo, 2008 – 2013.

<sup>10</sup> Agency for Statistics of BiH, Thematic bulletin 03: Women and men in BiH, Sarajevo, 2013.

both of which have governments with functions and powers that were not explicitly granted to BiH institutions by the Constitution. The Federation of BiH (51% of overall territory) is made up of 10 cantons, each of which has its own government and adopts its own laws, and they are further divided into 79 municipalities with a majority of Bosniak and Croat population, while Republika Srpska (49% of overall territory) is made up of 62 municipalities with a majority of Serb population. Given that the Dayton Peace Agreement did not resolve the issue of the inter-entity boundary in the area around Brčko, an arbitrary decision made on 5 March 1999 (Annex 2, Article 5 of the Dayton Peace Agreement), whereby Brčko District of Bosnia and Herzegovina was formed, under the exclusive sovereignty of the state.

The capital of Bosnia and Herzegovina is Sarajevo.

The highest legislative body in BiH is the Parliamentary Assembly of BiH which is made up of the House of Representatives and the House of Peoples. The collective function of the head of state is carried out by the Presidency of Bosnia and Herzegovina, which consists of three members, i.e. one Bosniak, Croat and Serb. The government function is carried out by the Council of Ministers of BiH which has nine members: the chairman, two deputies of the chairman, who make up the ministry at the same time, and six other ministers.

According to the *Law on ministries and other administrative bodies* („Official Gazette of BiH“, no. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103/09), BiH has nine ministries and they are:

- Ministry of Foreign Affairs
- Ministry of Foreign Trade and Economic Relations
- Ministry of Civil Affairs
- Ministry of Finance and Treasury
- Ministry for Human Rights and Refugees
- Ministry of Justice
- Ministry of Communications and Transport
- Ministry of Security
- Ministry of Defence

The BiH Presidency appoints the president of the Council of Ministers, who assumes his/her duty after the House of Representatives of the Parliamentary Assembly of BiH confirms his/her appointment. The president suggests potential candidates to be ministers, and the House of Representatives appoints them.

In the Federation of BiH, the Parliament of the Federation of BiH has legislative authority, and it is made up of the House of Representatives and the House of Peoples. The president and two vice presidents of the Federation of BiH have executive power, as well as the Government of the Federation of BiH.

In Republika Srpska, the National Assembly of Republika Srpska and the Council of Peoples have legislative authority. The president and two vice presidents of Republika Srpska, as well as the Government of Republika Srpska have executive power.

Based on the decision of the International Arbitration Commission for Brčko, Brčko District was placed under the authority of the state of Bosnia and Herzegovina towards the end of 2000 and it has its own multiethnic government with a selected assembly, executive committee, judiciary and police forces.

According to the Constitution of Bosnia and Herzegovina, judiciary is in the authority of the entities, while at the level of Bosnia and Herzegovina the Constitutional Court of BiH makes decisions about appeals against judgments made by the supreme courts of the entities.

At the state level there are:

- Constitutional Court of Bosnia and Herzegovina,
- The Court of Bosnia and Herzegovina.

In the Federation of BiH there are: municipal courts, cantonal courts and the Supreme Court of the Federation of BiH as ordinary courts. The Supreme Court of the Federation of BiH is the highest appellate court in the Federation. Along with 10 cantonal courts, there are also 27 municipal courts.

In Republika Srpska there are 19 primary courts. Besides the primary courts, there are also five regional courts and the Supreme Court of Republika Srpska.

#### 2.1.4 BOSNIA AND HERZEGOVINA'S INTERNATIONAL RELATIONS

On 16 June 2008 in Luxembourg, BiH signed the Stabilisation and Association Agreement which established a formal contractual relationship between BiH and the European Union. The goals of this Agreement are: to develop a political dialogue between the Union and BiH, to start gradually harmonising the national legislature of BiH with the Community acquis (*Acquis communautaire*), to promote economic relations between the two sides, to gradually develop free trade zones between the two sides and to encourage regional cooperation within the Stabilisation and Association Agreement. The Agreement grants the signatory country the status of a potential candidate for EU membership.

On 13 December 2006, the BiH Presidency made a Decision on Accepting the Framework Document of NATO's Partnership for Peace Program. The Partnership for Peace is a program of practical bilateral cooperation between individual partner countries and NATO. The Chairman of the Presidency of Bosnia and Herzegovina signed the Framework Document in Brussels on 14 December 2006. In this way, BiH also formally became a member of the Euro-Atlantic Partnership Council – EAPC and acquired all the rights and commitments in accordance with the signed Framework Document and General Partnership Document.

#### 2.1.5 MAIN CHARACTERISTICS OF THE ECONOMIC SECTORS

The nominal gross domestic product (GDP) in BiH was 26,282 million KM in 2013<sup>11</sup>. According to the data of the Central Bank of Bosnia and Herzegovina (CBBiH), the GDP growth rate was 1.51%, and the industrial production growth rate was 6.4 %. The official inflation rate is -1.2 % and it is a consequence of the drop in food and oil prices in international markets. The external debt amounts to 7.4 billion KM or 28.3 % of the GDP, while the current account deficit is 5.5 % of the GDP. Foreign direct investments, according to the estimate of the CBBiH, amounted to 478 million KM in 2013.

Bosnia and Herzegovina still does not have an adopted development strategy. For the last fifteen years, there have been attempts to make plans for economic development, however, due to the lack of political will, goals and priorities have not been defined in Bosnia and Herzegovina in order to achieve quicker and better economic development, and that is one of the reasons why BiH economy is behind, compared to other European countries.

##### National accounts

Table 6 shows the GDP indicators for the period of 2009 – 2013.

*Table 6:  
GDP indicators in BiH  
for the period of 2009 –  
2013<sup>12</sup>*

Year	2009	2010	2011	2012	2013
GDP (millions of KM)					
BIH	24,321	24,874	25,767	25,734	26,282
FBIH	15,516	15,992	16,489	16,554	16,914
RS	8,236	8,318	8,682	8,585	8,761
BD	569	564	596	595	607

The official currency of the convertible mark (KM or BAM) was introduced in 1998 and it is associated with the Deutsche Mark (DEM) in a 1:1 ratio, and later on after the introduction of the euro, it was associated with the euro in a 1 EUR = 1,95583 KM ratio.

The average price level in Bosnia and Herzegovina was higher by 2,0% in 2012 compared to the average for 2011, while in comparison to EU 27 the average price index for household final consumption expenditure in BiH amounts to 57%.

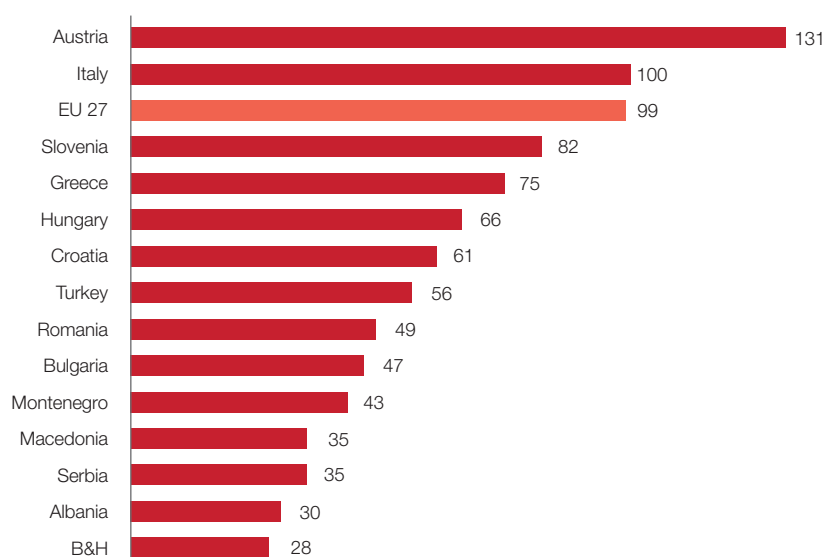
<sup>11</sup> Data from Agency for Statistics of BiH, Federal Institute of Statistics and Republic Institute for Statistics of RS

<sup>12</sup> Data from Agency for Statistics of BiH, Federal Institute of Statistics and Republic Institute for Statistics of RS

Year	2009	2010	2011	2012	2013
Average monthly net salary (KM)					
BIH	790	798	816	826	827
FBIH	792	804	819	830	835
RS	788	784	809	818	808
BD <sup>14</sup>	769	797	807	819	817

*Table 7:*  
Average monthly net salaries in BiH for the period of 2009 – 2013<sup>13</sup>

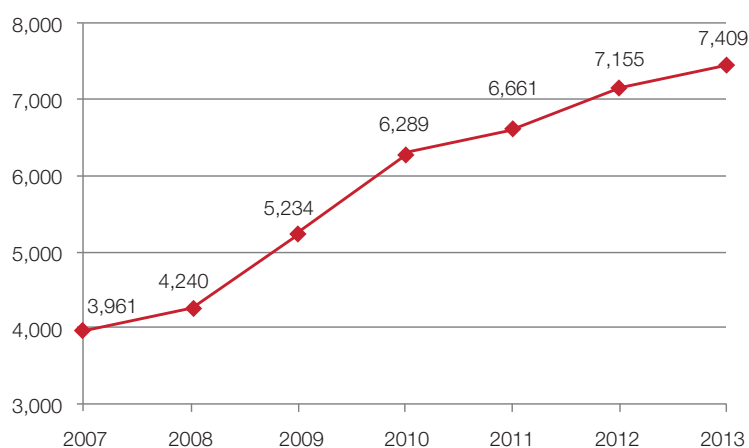
The purchasing power standard (PPS) for Bosnia and Herzegovina in 2012 is shown in Figure 4.



*Figure 4:*  
Purchasing power standard for 2012 in BiH in comparison to countries in the region and the EU<sup>15</sup>

The coverage of imports by exports amounted to 52% in 2010, 53% in 2011 and 51% in 2012. The most significant products in the flow of exports of BiH in 2012 were primary aluminium alloys valued at 444,897,000 KM, and the most significant product in the flow of imports in BiH in 2012 was crude oil valued at 1,195,672,000 KM. The most significant export and import partners of BiH are Germany and Croatia.

According to the Ministry of Finance and Treasury of BiH, BiH is considered as a country with a moderate external indebtedness.



*Figure 5:*  
External debt of BiH Government sectors – shown in millions of KM<sup>16</sup>

<sup>13</sup> Central Bank of BiH: Annual Report 2009 – 2013

<sup>14</sup> Agency for Statistics of BiH: "Press Release: Statistical data of Brčko District of BiH", June 2014

<sup>15</sup> Agency for Statistics of BiH, "BiH in numbers", Sarajevo 2013

<sup>16</sup> Central Bank of Bosnia and Herzegovina

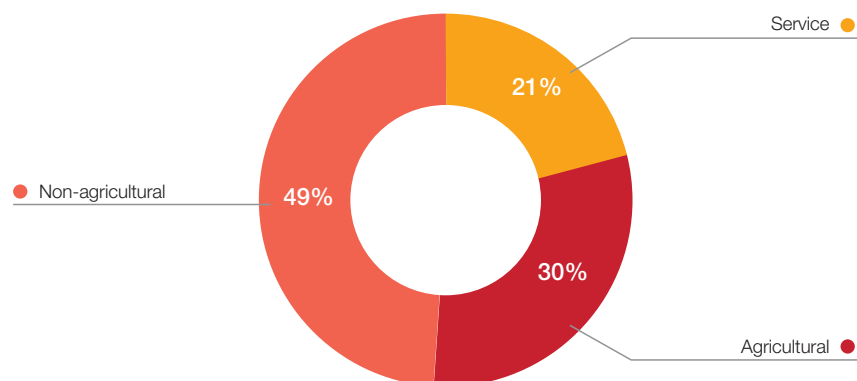
Based on the activities of investors (EU NACE Rev. 2) the biggest investments from overall investments in 2013 were in<sup>17</sup>:

- C Processing industry 16.76 %,
- G Wholesale and retail 14.47 %,
- M Professional, scientific and technical activities 12.44 %
- O Public administration and defence 11.36 %,
- D Production and supply of electricity 8.53 %.

Figure 6 shows the structure of employees based on their type of work in BiH.

**Figure 6:**  
Employees based on  
their type of work\* in  
BiH in 2012<sup>18</sup>

\* Type of work according  
to NACE Rev. 2:  
agricultural (A); non-  
agricultural (B, C, D, E,  
F, G, H, I, J, K, L, M, N);  
service (O, P, Q, R, T, U)



**Table 8:**  
Index of industrial  
production in BiH for the  
period of 1998 – 2013<sup>19</sup>

Year	Month	Month/same month of previous year			Period /same period of previous year		
		FBIH	RS	BIH	FBIH	RS	BIH
1998	12	115.4	115.5	...	123.8	123	...
1999	12	109.1	92.7	...	110.6	101.6	...
2000	12	105.7	103.5	...	108.8	105.6	...
2001	12	107.4	74.6	...	112.2	87.1	...
2002	12	113.9	119.4	...	109.2	97.5	...
2003	12	107.8	100.9	...	104.8	105.7	...
2004	12	109	113.9	...	113.2	109.7	...
2005	12	105.1	112.9	...	106.1	119.8	...
2006	12	106.7	128.5	...	110.4	119.1	...
2007	12	98.4	102	...	108.6	101.4	106.6
2008	12	109.4	199.6	...	107.9	116.8	107.3
2009	12	90.1	121	95.5	88.4	119	96.7
2010	12	112.7	114.1	108.7	104.2	105	101.6
2011	12	93.6	93.3	100.4	102.5	104.7	105.6
2012	12	99.6	98.5	95.2	95.7	95.8	94.8
2013	12	107.7	104.7	107	107.4	104.1	106.4

The number of registered companies in the last three years based on the classification of activities is shown in Figure 7.

<sup>17</sup> Agency for Statistics of BiH: Press Release "Investments in 2013, prior data", August 2014.

<sup>18</sup> Agency for Statistics of BiH, „BiH in numbers“, Sarajevo 2013.

<sup>19</sup> Central Bank of Bosnia and Herzegovina: Yearly Report 2013, Sarajevo 2014.

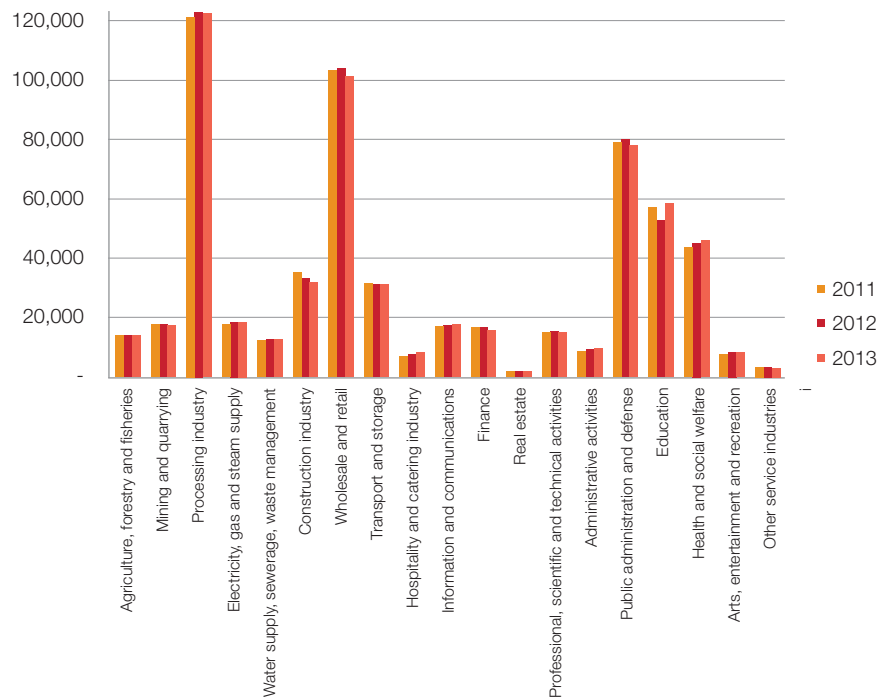


Figure 7:  
Registered companies  
in BiH for the period of  
2011 - 2013<sup>20</sup>

### Agriculture, forestry and fisheries

Agricultural production in BiH is not intense and is characterised by low productivity. This sector contributes 7.4% to the state's GDP. In 2013, in the overall structure of sown areas, grains contributed with 58%, industrial crops with 2%, vegetables with 15% and fodder with 25% (Table 9). The most significant production of grains was that of corn (kernel) with 539,432 tonnes in 2013.

Year	2009	2010	2011	2012	2013
Harvested areas (x 1,000 ha)					
Grains	310	293	303	304	305
Industrial crops	7	7	8	8	8
Vegetables	76	76	78	78	75
Fodder	132	136	138	137	129
Nurseries and so on on plough fields	2	3	4	3	3
Fallows and uncultivated plough fields	472	492	478	476	478

Table 9:  
Usage of arable land  
in BiH for the period of  
2009 – 2013<sup>21</sup>

When it comes to livestock products, poultry production is most significant with 41,548 tonnes in 2013, followed by that of cattle and pigs. Compared to 2012, the production of livestock products has been reduced by 28%<sup>22</sup>.

In BiH, when it comes to consumable fish, the production of trout and carp is most significant (94.6% of overall production, which for 2013 amounted to 3,584 tonnes). The overall production of consumable fish has been in a constant decline since 2010.<sup>23</sup>

The overall production of forest products in BiH in 2013 was higher by 6 % compared to 2012, with an overall production of 4,024,171 m<sup>3</sup> in 2013<sup>24</sup>.

### Industry

BiH was one of the least developed republics of former Yugoslavia with a gross domestic product (GDP) that was less than 68% of the average GDP of Yugoslavia in 1987. The most significant types of industry were metal processing, the automobile industry, the chemical industry and energy production, mining and metallurgy, the textile industry and the production

20 Agency for Statistics of BiH, „Press Release: Statistical business register – Main data about companies“, Sarajevo 2011 – 2013.

21 Agency for Statistics of BiH, „Press Release: Agriculture -harvested area and production by crops“, Sarajevo 2009 – 2013.

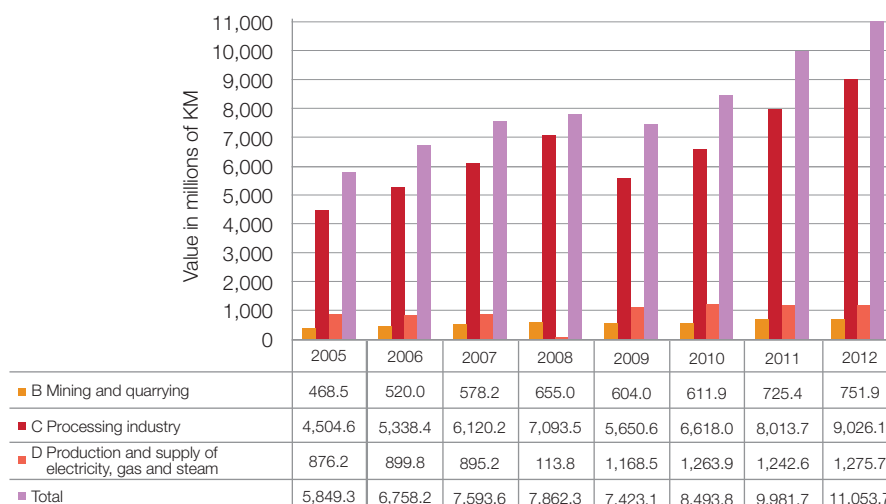
22 Agency for Statistics of BiH, „Press Release: Agriculture-Slaughter of livestock and poultry in slaughterhouses, 2013“, Sarajevo 2014

23 Agency for Statistics of BiH, „Press Release: Aquaculture – Yearly Report on Aquaculture Sarajevo 2011. – 2013

24 Agency for Statistics of BiH, „Press Release: Forestry-Production, sale and stocking of forest products , 2013“, Sarajevo 2014

of leather and machinery, and they generated around 39% GDP, employed around 44% of the workforce and participated with 99% in the exports of the country. In BiH in 1961, there were 54.3% of all working people employed in these industries, 57.8% in 1971, 58.4% in 1981 and only 35.2% in 2000. The poor state of the BiH industry was caused by war-time destruction and by the loss of pre-war markets, but also by a planned development, rather than a commercial development of the industry during the time of SFRY. Besides that, the use of outdated technologies lead to air pollution and other forms of environmental pollution, which is one of the most important problems in the industrial sector of BiH. Figure 8 shows industrial production in BiH based on the industry branch. Today, this sector contributes with 20.8% to the GDP of the state<sup>25</sup>.

**Figure 8:**  
Regular industrial  
production in BiH for the  
period of 2005 -2012<sup>26</sup>



#### Mining and the extractive industry

Most existing coal mines supply the power plants in both entities, and the rest of the coal is used in various industries, and for heating and households in BiH and in neighbouring countries. According to BHAS data, production in this sector during January-September 2013 was reduced by around 7% compared to the same period of the previous year. The production of coal in Bosnia and Herzegovina in 2013 amounted to 11,764,827 tonnes. When it comes to metal ores, the extraction of iron ore is most significant, and in 2013 it amounted to 2,121,907 t, which represents an increase in production of around 5% compared to the same period of the previous year.

#### Processing industry (food, metallurgy, textile, etc.)

The processing industry in BiH is quite export-oriented and in recent times it has largely depended on market trends of major trading partners<sup>27</sup>. With a total of 4,904 registered companies and 126,084 employees in 2011, the added value created in the processing industry has a 26.8% share in the GDP<sup>28</sup>.

#### Chemical industry

Before the war, the most significant chemical industry facilities in BiH were located in the Tuzla Basin. However, war-time destruction left its mark and most chemical companies did not recover, such as the complex of chlor-alkali industry in Tuzla, which is now in ruins and represents a significant source of ground contamination, primarily by mercury. The chemical industry in BiH was based on production without exception from imported raw materials or intermediate products for the protected Yugoslav market. The most significant products were soda, sodium hydroxide, nitrogen fertiliser and detergents.

#### Energy

The main domestic sources of energy in BiH are coal and hydropower potential, while natural gas and oil are imported. The production of electricity in 2012 amounted to 13,035 GWh, and the final consumption amounted to 11,097 GWh, where households had a share of 41.4%, followed by industry 38.7% and other consumers, including those from the construction industry, transport and agriculture 19.9%. In 2012, the largest industrial consumer of electricity was the industry of manufacturing non-ferrous metals, with a share of 47.5%.

25 Agency for Statistics of BiH, "Bosnia and Herzegovina in numbers 2013.", Sarajevo, 2013

26 Agency for Statistics of BiH, "Industrial production in Bosnia and Herzegovina for 2012 – PRODCOM results", Thematic bulletin TB 05, Sarajevo 2013

27 Directorate for Economic Planning, "BiH: Economic trends January – September 2013", Sarajevo 2014

28 Agency for Statistics of BiH, "BiH in numbers", Sarajevo 2013



The overall production of thermal energy in Bosnia and Herzegovina in 2012 was 6,075 TJ, where 3,757 TJ or 61.8% was produced in heating plants, 1,498 TJ or 24.7% in power plants, and 820 TJ or 13.5% were produced in industrial power plants. In the final consumption of thermal energy in 2012, households had the biggest share with 75.8%, and the industry and other consumers with 24.2%<sup>29</sup>.

### Transport

The transport of goods and passengers in BiH is constantly increasing, which enables the establishment of private and business connections, as well as the economic development of the state. Road, rail and air transport is mostly used. Water transport is not well developed in BiH and does not have a big influence on the overall transport of goods and people. Currently, a motorway called Corridor Vc is being built and it should significantly improve the conditions of road transport within the country and ensure a better link with European countries. In RS, the motorway Banja Luka – Gradiška, length of 34 km, has been built and operated, while the motorway Banja Luka – Doboje, 72 km in length, is currently being built. The most significant part of road transport takes place in private vehicles. In BiH air traffic is not well-developed, with 4 international airports in Banja Luka, Mostar, Sarajevo and Tuzla, with around 670,000 passengers per year, where the most significant traffic takes place at the Sarajevo Airport with around 500,000 passengers per year.

### Construction industry

In the construction sector of BiH, the most significant activities are in civil engineering works, with a share of 55.9% out of overall construction works. From that percentage, the transportation infrastructure is most prevalent with 77.3%, i.e. in the value of 544,528,000 KM annually. This sector contributes with 4.7% to the GDP of the state.

### Infrastructure

The total length of the road network in BiH in 2013 amounted to 22,871.96 km, where 83.5 km made up the motorway, 30.7 km of roads were reserved for motor vehicle traffic, 3,843.2 km were main roads, 4,714.5 km were regional and around 14,200 km were local roads<sup>30</sup>. The total length of the railway infrastructure in BiH is 1,034 km, where 879 km are made up of single-track railways and 93 km of double-track railways<sup>31</sup>. The total length of the water supply network is 15,065 km, and the sewerage network amounts to 4,240 km<sup>32</sup>. The length of the gas pipeline in BiH is 194 km<sup>33</sup>.

According to the Federal Institute of Statistics, in FBiH the transport infrastructure consists of: the road infrastructure (50 km of motorways, 1,977 km of main roads and 2,540 km of regional roads), the railway infrastructure (601 km of railway lines) and 3 international airports (Sarajevo, Tuzla and Mostar). According to the Institute for Statistics of RS, in RS the transport infrastructure consists of: the road infrastructure (34 kilometers of motorways, 1,766.1 km of main roads, 2,142.9 km of regional roads, 223.1 km of local roads of special public interest and over 10,000 km of local roads and streets in the settlements), the railway infrastructure (425.4 km of railway lines), an international airport and 205 km of waterways.

### Utility services

In BiH utility services are under the jurisdiction of local authorities – municipalities, which are treated as the founders of companies with a status of legal entities which are owned by the state whose purpose is to ensure the reasonable living conditions of the population. Utility services which were founded by cities, i.e. local communities are organised like public utility companies – joint stock companies owned mostly by the state, and more rarely they are private companies. Usually the public utility company is responsible for the overall utility infrastructure in the municipality, which includes water supply, wastewater disposal, waste management and maintenance of public areas.

### Tourism

The official available statistics do not portray the real state of tourism in BiH. The number of tourists is considered to be a lot higher than what is shown in official data. However, Bosnia and Herzegovina has, as a tourist destination, recorded an annual increase of 4-6% in the number of arrivals of foreign tourists in previous years. In 2007, the ratio of tourist spending was 5.3% of the GDP in Bosnia and Herzegovina, 18.8% in exports, and the ratio of export of services was 59.9%<sup>34</sup>. Based on the predictions of the World Tourism Organisation<sup>35</sup>, Bosnia

29 Agency for Statistics of BiH, „Press Release: Energy Statistics“, Sarajevo 2014

30 BIHAMK, Information on the state of the road network in Bosnia and Herzegovina in 2013, Sarajevo 2013

31 FBiH Railways and RS Railways

32 Agency for Statistics of BiH, „Press Release: Environment – Public sewerage system“, Sarajevo 2013 and Agency for Statistics of BiH, „Press Release: Environment– Collection and distribution of water in 2012“, Sarajevo 2013

33 A Study of the Energetics Sector in BiH – Final report 2008

34 Development Bank of Turkey, Reports based on sectors for Bosnia and Herzegovina: Tourism sector.

35 UNWTO - United Nations World Tourism Organization

and Herzegovina is one of the leading countries in the world in regards to the expected growth of tourism until 2015. The most significant number of tourists in BiH comes from neighbouring countries Croatia, Serbia and Slovenia<sup>36</sup>.

### Trade

In BiH, the added value created in distributive trade has a share of 13.3%<sup>37</sup> in the GDP and employs 27.7% of the overall number of employed people in BiH with 11,244 registered companies in 2011<sup>38</sup>.

## 2.1.6 STATE OF THE ENVIRONMENT

The state of the environment in BiH is a consequence of human activities, the bad economic situation and wartime events during the 1990s. Apart from that, as the centre of heavy industries, during SFRY in the pre-war period, BiH was exposed to serious pollution of its basic natural resources – water, soil and air.

Environmental management was not a priority in the process of post-war economic recovery in BiH and it is a problem in the entire country due to the non-optimal institutional, strategic and legal framework. There is still no policy on environmental protection at the state level which would resolve priorities in terms of the environment<sup>39</sup>. However, BiH has achieved some progress in getting closer to EU rules and standards on environmental management, primarily by adopting framework laws on the environment, which are described in detail in Chapter 2.2.1.

### Air

Air pollution in BiH comes mostly from industrial activities and traffic. Emissions from industrial processes have reduced compared to the pre-war period, so the air quality in BiH is a lot better than prior to the 1990s due to the devastation of the industry. However, with the increase of volume and concentration of traffic, exhaust gas emissions also increase, and this is most prevalent in larger urban areas. Air pollution is significantly higher in winter months, mostly occurring in larger urban areas in BiH, and it is mostly a consequence of inadequate heating systems. Hydrometeorological institutes in FBiH (Sarajevo) and in RS (Banja Luka) regularly monitor air quality. The institutes determine the qualitative and quantitative characteristics of air in the main network of weather stations (Sarajevo, Ivan-sedlo, Tuzla, Zenica, Mostar and Banja Luka)<sup>40</sup>.

### Surface and subterranean waters

Monitoring the quality of surface waters in BiH is performed in accordance with, for this field, relevant entity regulations and the regulations of the Brčko District. Although entity regulations are harmonised with EU directions in the water sector, the list of parameters which are observed systematically with the purpose of assessing the chemical status of surface waters does not contain all the substances which are subject to the Stockholm Convention. In the future, these lists should be harmonised and programs for the assessment of water quality should also include POPs from the list of the Stockholm Convention. Monitoring the quality of inland and coastal waters for swimming is not performed systematically, but rather based on current needs and available financial resources, while the systematic monitoring of the quality of subterranean waters is not performed in a satisfactory manner. Based on the estimates in strategic documents, only 33% of the population is connected to the public sewerage system, while only a couple of municipalities have the operational facilities for wastewater treatment. The rest is released directly into bodies of water. However, the state of rivers in BiH is generally good, considering the oxygen content of water, even though the Bosna River is more polluted than other rivers. The subterranean water quality is still mostly good. The waters which are used as a public water supply mostly do not require treatment, besides the mandatory disinfection<sup>41</sup>.

### Soil

In BiH, the main characteristics of land are its low content of humus and fertilisers, soil is mostly shallow, and there is excess water on around 14% of the territory. Acidic soils take up 1/3 of the terrain in BiH, and over 80% of the terrain has a slope of over 13% which is

36 Agency for Statistics of BiH

37 Agency for Statistics of BiH, "Gross domestic product based on the production and income approach 2005 - 2012", Sarajevo, 2014

38 Agency for Statistics of BiH, "Bosnia and Herzegovina in numbers 2013.", Sarajevo, 2013

39 UN Economic Commission for Europe, Review on the state of the environment Bosnia and Herzegovina - Second review, New York and Geneva 2011

40 Ministry of Foreign Trade and Economic Relations of BiH, State of the Environment Report in BiH 2012, Sarajevo, 2012

41 Ministry of Foreign Trade and Economic Relations of BiH, State of the Environment Report in BiH 2012, Sarajevo, 2012

conducive for water erosion. The most significant factors for soil degradation in BiH are surface mining or surface mining of mineral ores and the disposal of slag and fly ash from industrial production<sup>42</sup>.

### Biodiversity

BiH is characterised by a high level of biodiversity, as well as a significant phenomenon of endemic and relict forms of living organisms. In BiH, more than 5,000 types and subtypes of vascular plants, over 100 types of fish, and over 320 types of birds and other elements of biodiversity have been identified<sup>43</sup>. The territory where the protected areas of BiH are located is relatively small, and the percentage share of such territory compared to the overall territory of BiH is 2% and is way below the European average.

### Environmental pressures

#### *Waste management*

In BiH, the estimated amount of generated municipal waste in 2012 amounted to 340 kg/year per capita<sup>44</sup>. The level of coverage by waste disposal services is 74%, and out of the overall amount of collected waste, 96% is disposed of at landfills. Only 5 landfills have elements which fulfil the criteria for sanitary disposal out of a total of 91 registered landfills in BiH. Generally, the infrastructure for waste management is underdeveloped and mostly based on the principle of weekly waste collection by utility companies which are mostly public and are not financially viable. Even though currently a process of construction of regional sanitary centres for waste management is underway, which will mean that many municipal landfills will have to close down, there are regions in BiH which still have not solved the issue of the regional concept of waste disposal.

#### *Management of chemicals*

In BiH there is a significant disproportion in the number and type of adopted laws and bylaws on the management of chemicals between the entities and BD. The management of chemicals refers to their production, procedures for placement on the market, classification, labelling and adequate usage, i.e. the entire life cycle of the chemical. Since 2009, in RS the *Law on Chemicals* (Official Gazette of RS, no. 25/09) and the *Law on Biocides* (Official Gazette of RS, no. 37/09) are in force, and based on these laws in the period of 2010-2013 a large number of bylaws which were harmonised with EU regulations were adopted. In FBiH, old laws taken over from SFRY, which are related to the management of chemicals are still in force, and the Law on Chemicals, the Law on Biocides and the Law on Transport of Hazardous Substances, which are in parliamentary procedure, are being drafted. In BD there is also still no adopted legislation which regulates the management of chemicals. The adoption of these laws and bylaws of identical content in FBiH and DB will represent a guarantee of effective management and monitoring of chemicals which are on the BiH market. In BiH, the monitoring of the effect of chemicals on human health is divided between multiple state and entity agencies and laboratories, but there is no systematic reporting on hazardous chemicals and substances in all environmental segments. The main causes of toxic chemicals and substances are similar across the world, and BiH is no exception – inadequate municipal waste disposal and industrial, mine and hospital waste disposal, the lack of facilities for the treatment of wastewater, and sewerage which is released directly into open bodies of water.

#### *Natural disasters*

In BiH, the most significant natural disasters are fires, floods, and landslides. Apart from that, it is estimated that 2.4%<sup>45</sup> of the total area of BiH is still covered with mines, which is a consequence of war-time events.

### Environment and health

The World Health Organisation (WHO) states in its report „Preventing disease through healthy environments“ that as much as 24% of diseases in the world are caused by exposure to environmental impacts which could have been avoided. The existence of a supply of drinking water for the population is one of the main prerequisites for a good level of health in any population. According to the data from the project “Researching the health and social state of children and women in BiH“ 98.7% of the population in BiH has an adequate source of drinking water, and around 93.0% of households have sanitary facilities.

42 Ministry of Foreign Trade and Economic Relations of BiH, State of the Environment Report in BiH 2012, Sarajevo, 2012

43 Ministry of Foreign Trade and Economic Relations of BiH, State of the Environment Report in BiH 2012, Sarajevo, 2012

44 Agency for Statistics of BiH, „Press Release: Environment – Public sewerage system“, Sarajevo 2013 and Agency for Statistics of BiH, „Press Release: Environment – Public transport and disposal of municipal waste“, Sarajevo, 2013

45 Mine Action Centre in BiH (BH MAC), The mine situation in 2013.

## 2.2 INSTITUTIONAL AND REGULATORY FRAMEWORK IN BOSNIA AND HERZEGOVINA

### 2.2.1 ENVIRONMENTAL POLICY AND SUSTAINABLE DEVELOPMENT AND GENERAL LEGAL FRAMEWORK

#### 2.2.1.1 Overview of general legislation in the field of environmental protection in BiH

##### Federation of BiH

**Law on Environmental Protection** (Official Gazette of FBiH, no. 33/03 and 38/09) regulates the conservation, protection, restoration and enhancement of environmental quality and capacity of the environment and quality of life; measures and conditions of management, conservation and rational use of natural resources; equal measures and institutions of conservation, protection and improvement of environmental protection; financing of activities related to the environment and voluntary measures and tasks and duties of administrative bodies at various levels of government.

In accordance with the principles of cooperation and shared responsibility this law aims to:

- Reduce use, preventing the loading and environmental pollution, prevent disruptions, as well as the improvement and restoration of the damaged environment;
- Protect human health and the improvement of environmental conditions for quality of life;
- Preserve and protect natural resources, rational use of resources and a way to ensure the economy which recovers resources;
- Harmonize other interests of entities with environmental protection requirements;
- Internationally cooperate in environmental protection;
- Develop initiatives from the public and public participation in activities that aim to protect the environment;
- Coordinate the economy and the integration of social and economic development in accordance with the requirements of environmental protection and
- Establish and develop institutions for the protection and preservation of the environment.

**Law on Air Protection** (Official Gazette of FBiH, no. 33/03 and 4/10) regulates the technical terms of measures to prevent or reduce air emissions caused by human activities that must be respected in the process of production, in the territory of FBiH, planning air quality, special sources of emissions, emission inventory, air quality, monitoring and sanctions for legal entities and individuals.

These measures are undertaken by applying the principles of: - an integrated approach to the protection of the environment, including air, water and soil, as well as a commitment to reduce emissions to a minimum by using the best available technology; - The polluter pays principle, which ensures that the costs of reducing air pollution are borne by the operators of emission sources of pollutants; - Harmonization of the operational safety requirements with environmental protection requirements; - Improving the quality of air within and out of the territory of FBiH.

Federal and cantonal authorities are responsible for ensuring public participation in the preparation of spatial planning documents and other plans that affect air quality, as well as in the preparation of air quality policies and action plans on pertaining to air, in determining the location, procedures for issuing permits and inspections of emissions sources.

**Law on Water** (Official Gazette of FBiH, no. 70/06) provides for water management in order to decrease water pollution, to achieve good water status and prevent degradation of water; achieving sustainable water use; ensuring equitable access to water; encourage social and economic development; protection of ecosystems; reduce the risk of flooding and other adverse impacts of water; ensuring public participation in decision-making related to water;

prevention and resolution of conflicts related to the protection and use of water and the fulfilment of obligations under international treaties which are binding for BiH.

**Law on Nature Protection** (Official Gazette of FBiH, no. 66/13) regulates the conditions and methods of restoration, protection, conservation and sustainable development of the landscape, natural areas, plants, animals and their habitats, minerals and fossils, and other components of nature in the territory of FBiH, the authority to carry out tasks in environmental protection, nature conservation planning, general and special measures for the protection of nature, the information system, supervision, financing nature conservation and fines for legal entities and individuals.

**Law on Waste Management** (Official Gazette of FBiH, no. 33/03 and 71/09) governs all categories of waste, excluding radioactive waste, gases emitted into the atmosphere and wastewater, as well as all types of waste management activities, operations and systems.

The provisions of this law also apply to waste resulting from prospecting, extraction, treatment and storage of mineral resources and the working of quarries; liquid waste; animal waste and other non-hazardous materials of natural origin that can be used for agricultural purposes, and defused explosives, unless regulated by a special regulation.

**Law on Environmental Protection Fund** (Official Gazette of FBiH, no. 33/03) established the Fund for Environmental Protection of FBiH, establishes the structure, organization, management and control of the Fund, the assets and activities of the Fund, allocation and use of resources of the Fund, as well as other issues related to the acquisition and management of the Fund resources. The Fund is a financial organization that is a legal entity and is entered in the court register.

### Republika Srpska

**Law on Environmental Protection** (Official Gazette of RS, no. 71/12) regulates the protection of the environment for the sake of its preservation, reducing the risk to human life and health, and ensuring and improving the quality of life, the protection of all elements of the environment, information and access to information in the field of environmental protection, planning and environmental protection, strategic environmental impact assessment and environmental impact, the issuance of permits and the prevention of large-scale accidents, a system of eco-labelling and environmental protection management, financing activities related to the environment, responsibility for damage caused to the environment, as well as the rights and obligations of legal and natural persons engaged in activities determined by this law.

**Law on Air Protection** (Official Gazette of RS, no. 124/11) regulates the protection and management of air quality and determine the measures and methods of organizing and controlling implementation of protecting and improving air quality as a natural resource of common interest which enjoys special protection. The provisions of this Law do not apply to pollution caused by radioactive materials, industrial accidents and natural disasters

**Law on Water** (Official Gazette of RS, no. 50/06, 92/09 and 121/12) regulates the method of integrated water management within the territory of RS. Water management includes integrated approach, namely: water protection, water use, protection from the harmful effects of water, regulation of watercourses and other water bodies and the public good.

**Law on Nature Protection** (Official Gazette of RS, no. 20/14) regulates protection and conservation of nature, biological, geological and landscape diversity as part of the environment.

**Law on Waste Management (Official Gazette of RS, no. 111/13)** regulates the types and classification of waste; planning, organizing, financing and supervision of waste management; actors, responsibilities and obligations in waste management; management of specific waste streams; the licensing process; transboundary movement of waste; Reporting on waste and databases.

Article 58 of the Law treats POPs waste, which is defined as wastes consisting of, containing or contaminated with POPs substances. The person performing the treatment or disposal of waste shall ensure that remains after treatment do not have the characteristics of POPs substances. Owner of POPs waste is required to report to the Ministry of the type and amount of POPs wastes.

The law requires the adoption of a regulation that will prescribe a list of POPs substances, methods and procedures for the management of POPs wastes and limit values for concentrations of POPs matter relating to the disposal of waste that contained the contaminated POPs substances. However, given that this Law was adopted in December 2013, by laws have not yet been prescribed and the deadline for their adoption is one year from the date of entry into force of the Law.

**Law on the Fund and Financing of Environmental Protection of RS** (Official Gazette of RS, no. 117/11) regulates the status, activities, organization, income and usage of resources of the Fund for Environmental Protection and Energy Efficiency of RS and conditions, procedure and method of financing environmental protection and energy efficiency.

**Law on Chemicals** (Official Gazette of RS, no. 25/09) regulates the classification, packaging and labelling of dangerous chemicals; exchange of information on chemicals through safety data sheet; integral inventory of chemicals produced and imported; good laboratory practice; restrictions and prohibition of substances of concern; conditions for the import and export of chemicals for which the procedure for prior approval is prescribed; authorization to manufacture, trade and use hazardous chemicals; systematic monitoring of chemicals; placing on the market of detergents; supervision and other issues of importance for the safe management of chemicals. This law is based on the principle that manufacturers, importers or end-users should ensure to place on the market products or use substances that do not have adverse effects on human health or the environment. The provisions of this law are largely harmonized with the EU legislation in this area, namely: Regulation 1907/2006 (REACH) Regulation 1272/2008 (CLP), Regulation 689/2008, Regulation 648/2004, Regulation 440/2008, Directive 2004/9 / EC and Directive 2004/10 / EC.

#### **Brčko District BiH**

**Law on Environmental Protection** (Official Gazette of BD, no. 24/04, 1/05 19/07 and 9/09) regulates the conservation, protection, restoration and enhancement of environmental quality and capacity of the environment and quality of life; measures and requirements for the management, conservation and rational use of natural resources; framework of legal measures and institutions for the preservation, protection and improvement of environment protection; financing activities related to the environment; tasks and duties of the District provided by law and by-laws and the obligations of the District.

This law aims at:

- Reduced use, preventing the loading and environmental pollution, prevention of disruption, as well as improvement and restoration of the damaged environment;
- The protection of human health and improve environmental conditions for quality of life;
- Conservation and protection of natural resources, rational use of resources and a way to ensure the economy recover resources;
- Compliance of other interests of the District with requirements for the protection of the environment; international cooperation in environmental protection;
- Initiatives from the public and public participation in activities aimed at the protection of the environment;
- Coordination of the economy and the integration of social and economic development in accordance with the requirements of environmental protection and
- The establishment and development of institutions for the protection and preservation of the environment.

**Law on Air Protection** (Official Gazette of BD, no. 25/04, 19/07, 1/05 and 9/09) regulates the protection of air against pollution in order to protect human health, climate and the environment from the harmful effects of air pollution. Protection of air pollution caused by radioactive materials, industrial accidents and natural disasters, is regulated by a special law.

**Law on Water** (Official Gazette of BD, no. 25/04 and 19/07) regulates the protection of water from pollution and unreasonable use. Water protection includes the maintenance and regulation of required quantity of water, good condition, maintaining the shore and water land and making decisions on the achievement of rational-sustainable use. Water protection ensures the sustainable use of water in order to preserve and improve their quality, preservation of natural processes and natural balance of water, plant and animal species and their habitats that depend on water and provides the necessary amount of water for various purposes.

**Law on Nature Protection** (Official Gazette of BD, no. 24/04, 1/05 19/07 and 9/09) regulates the restoration, protection, conservation and sustainable development of the landscape, natural areas, plants, animals and their habitats, land, minerals and fossils and other natural components, which are part of the environment, in the manner and subject to the conditions set forth in this law.

**Law on Waste Management** (Official Gazette of BD, no. 25/04, 19/07, 1/05, 2/08 and 9/09) regulates all categories of waste, excluding radioactive waste, gases released into the atmosphere, waste water, as all kinds of activities, operations and systems of waste management. The provisions of this law also apply to: waste resulting from prospecting, extraction, treatment and storage of mineral resources and the working of quarries; liquid wastes; animal waste and other non-hazardous materials of natural origin that can be used in agriculture for economic purposes and defused explosives, unless regulated by a special regulation.

### 2.2.1.2 Strategic documents in the field of environmental protection in BiH

#### Bosnia and Herzegovina

Although in BiH there is no single strategy for environmental protection at the state level, there are a number of strategic documents governing environmental protection and sustainable development.

**National Action Plan on Environmental Protection in BiH– NEAP**, adopted in 2003, defines the priority areas and the main objectives of environmental policy, and determines measures to achieve the stated goals. The main objective of the NEAP is to establish an integrated environmental protection system in BiH on the principles of sustainable development. This Action Plan has defined eight priority areas for environmental management with proposed measures to improve the environmental situation including: water resources (waste water), sustainable development and rural areas, environmental management (through the information system, integrated planning and training), protection of biological and landscape diversity, waste management, sustainable economic development, public health and demining. NEAP comprehensively creates and structures the processes for the protection of the environment and provides guidelines for starting a new practice in the overall development of BiH.

Bosnia and Herzegovina is committed to the implementation of the Millennium Development Goals. **Social Development Report /Millennium Development Goals in BiH 2003-2015**, which was created in 2003 for the period 2003 to 2015, contains a series of policy proposals with a view to achieving progress towards the full achievement of the relevant Millennium Development Goals at the local level and 18 specific goals for the country. 48 indicators for accurate monitoring of progress have been defined, and periodically progress reports are prepared.

Furthermore, in Bosnia and Herzegovina the Assessment of Sustainable Development in BiH was prepared for the summit in Johannesburg in 2002, Solid Waste Management Strategy (2002), UNECE EPR1 - The first review of the state of the environment (2004), The first national report on the implementation of the UN Convention for the combating desertification / land degradation in Bosnia and Herzegovina (2007), Medium-term strategy to combat poverty, the First National Report of BiH in accordance with the UN Framework Convention on Climate Change, I, II, III and IV Report of BiH to the UN Convention on Biological Diversity (2005-2010), Biodiversity Strategy and Action Plan (2010), UNECE EPR2 - Second review of the state of the environment (2011), Water Policy in Bosnia and Herzegovina (2011, in the process of adopting) report NCSA Report (National Capacity Self-Assessment, 2012), State of the Environment Report in Bosnia and Herzegovina (2012), "Bosnia and Herzegovina is in the process of Rio +20" - report of BiH to the UN Convention on Sustainable Development (UNSDC) which was held between 20 and 22 June 2012 in Rio de Janeiro, and the preparation of the Second National Communication of Bosnia and Herzegovina in accordance with the UN Framework Convention on climate Change is underway.

#### Federation of BiH

In accordance with the Law on Environmental Protection (Official Gazette of FBiH, no. 33/03 and 38/09), the **Environmental Protection Strategy of FBiH** was brought, with an **action plan for the period 2008-2018**, consisting of:

- Federal Nature Protection Strategy,
- Federal Air Protection Strategy,

- Federal Waste Management Strategy,
- Federal Water Management Strategy (which was created as a separate document).

The Environmental Protection Strategy of FBiH is primarily based on the principle of sustainable development and the guidelines of the *acquis* of the European Union with the aim of stabilization and accession to the EU. During the drafting of this strategic document a high degree of coordination and cooperation with other relevant sectors in the Federation of Bosnia and Herzegovina through inter-sectoral councils was ensured, where there were representatives from the following sectors: spatial planning, agriculture, water, forestry; energy, industry, mining, transport, etc. There has been vertical coordination and cooperation as well with the ten cantons in the Federation, as well as coordination with the RS entity, Brčko District and the Ministry of Foreign Trade and Economic Relations, through the Environmental Inter-Entity Body.

In the field of water, in December 2011, pursuant to the provisions of Article 24 Law on Water (Official Gazette of FBiH, No. 70/06), Water Management Strategy of the Federation of Bosnia and Herzegovina for the period until 2022 was adopted. Activities are carried out to develop management plans, assessment of compliance of national legislation with EU legislation and harmonization of regulations and implementation of institutional projects and water infrastructure projects.

**Agricultural Land Management Strategy of FBiH** was adopted in 2012 and includes measures, activities and execution time, and institutions for its implementation. With the aim of purposeful use of agricultural land, it recommends purposeful and rational use of this resource and its protection. Land management is based on an analysis of the legislation with the European strategy for soil protection with special emphasis on the relationship between agriculture and the Water Framework Directive.

**Strategic Plan and Programme for the Development of the Energy Sector Federation** from 2008 includes analysis of the current situation and identification of the need and possibilities for the development of the energy sector in the Federation, and to achieve a modern and sustainable development of the sector. The document identifies and analyzes current issues and changes that may affect the energy requirements and energy consumption in the region and the world, as well as the possibility of the return impact of these changes on the energy sector in BiH and FBiH.

### Republika Srpska

Republika Srpska does not have an **Environmental Protection Strategy** in place, but in RS there are other strategic frameworks within this area that consist of the following documents:

**Nature Protection Strategy** (2011) which establishes actions, plans, methods, and a series of measures to strengthen the awareness of the need to protect nature of RS, with concrete measures to improve the situation in the field of nature protection, represents an initial and very important step in the implementation of strategic objectives, and basically the aim is to promote an integrated approach to the preservation, promotion and use of space of RS, in accordance with the available natural capacities, adapting the concept of sustainable development and the association and accession of BiH to EU.

**Air Protection Strategy** (2011) is the strategic basis for determining the policies and progress in the management of air quality in the RS and the determination of regional policy, the successful implementation of the restructuring of the sector of environmental protection, ensuring long-term economic and energy development with coordinated monitoring and management of air quality, optimal use of local energy sources and energy management in an environmentally sound manner, achieving the world's air quality standards, etc. This document is also the basis for the report and efficient fulfilment of other commitments in connection with the United Nations Framework Convention on Climate Change, the Kyoto Protocol and post-Kyoto actions.

**Agriculture Development Strategy of RS** until 2015 (2006) is a document that sets goals and projections of long-term agricultural development in RS, the optimum use of agricultural resources (land, water, forests, genetic potential, etc.), increasing the productivity and an increase in competitiveness through technological levels, environmental protection and sustainable development. The RS Government adopted a Draft of Strategic Plan for the Development of Agricultural Production and Rural Areas of RS for the period from 2015 to 2020.



**Chemical Safety Strategy of RS from 2012 to 2016** from 2012 is a document that includes goals and measures for the protection of the environment in terms of ensuring comprehensive security of management of chemicals in RS. The aim of this strategy is efficient and transparent implementation of policies in the field of the safe use of chemicals, protection of public health and environmental protection through identification of key strategic objectives and measures for the establishment of a rational, efficient, dynamic and integrated system of chemical security of. When developing this Strategy, the basic principles and recommendations of the International Program Chemical security of (IPCS), the Intergovernmental Forum on Chemical safety (IFCS) and Strategic Approach to international chemicals management (SAICM) were respected.

**Energy Development Strategy of RS until 2030** (2012) establishes policies of energy development of RS focused on the use of domestic resources, renewable resources, energy efficiency measures, the application of modern energy technologies, while preserving the environment and reducing the harmful impact of the energy sector and ensuring sustainable development of the energy sector in terms of limited emissions of greenhouse gases.

**„Sectoral Strategies for Industry Development of RS for the period 2009-2013“** from 2009 (includes sectors of the metal and electrical industry, the timber industry and textile, leather and footwear) also defines the basic goals and directions of development of the industry on the path to modern society and developed economy with mandatory environmental protection and sustainable development.

**„Economic Policy for 2014“** is a document that largely follows the principles of environmental protection and on the basis of which the projects are realized in the field of ecology, which contribute to environmental protection, improvement of energy efficiency, sustainability and inclusion in European Integrations, taking into account that the in design and implementation of environmental policy are included, in addition to the relevant Ministry of Physical Planning, Civil Engineering and Ecology and the Fund for Environmental Protection of RS, the local community, business entities and non-governmental sector involved in the protection of the environment.

#### **Brčko District BiH**

The Development Strategy of Brčko District for the period 2008-2017 was developed in Brčko District, which represents a document with five strategic goals:

1. The strategic objective of economic development: agriculture, transport, food industry, knowledge, innovation and infrastructure facilities;
2. The strategic objective of social development: increase of solidarity, improvement of physical and mental health of the population;
3. The strategic objective of ecological development: the protection and improvement of the environment;
4. The strategic objective of regional development: the diversity of the urban structure of the city of Brčko with the encouragement of the ambient development;
5. The strategic objective of institutional development: decentralization, polycentricity, integration.

In May 2014, a public discussion was held, related to the adoption of the draft Environmental Strategy of the Brcko District of BiH for the period 2013-2023.

### **2.2.2 ROLES AND RESPONSIBILITIES OF MINISTRIES, AGENCIES AND OTHER GOVERNMENTAL INSTITUTIONS IN POPs MANAGEMENT**

The environmental administration in BiH has a quite fragmented and complex institutional structure. Environmental management and regulatory-control systems are very complex and in many cases overlap, especially when one takes into account that four administrative levels (state, entities, cantons, municipalities) have to work together.

Table 10 provides an overview of institutional responsibilities in the management of POPs chemicals through the stages of the life cycle of these chemicals.

Table 10:  
Institutional  
responsibilities for  
management of POPs  
chemicals

AREA	Responsible institution	Trade	Production	Use	Transport	Unintentional production	Import/ export	Waste disposal	Inspection
	Life-cycle phases								
	Ministry of Foreign Trade and Economic Relations of BiH	Focal Point on behalf of Bosnia and Herzegovina to coordinate cooperation with international structures and organs of the Stockholm Convention, and institutions in BiH for the implementation of the Stockholm Convention							
ENVIRONMENTAL PROTECTION	Federal Ministry of Environment and Tourism	x	x	x		x	x	x	
	Ministry of Spatial Planning, Civil Engineering and Ecology of RS	x	x	x		x	x	x	
	Department of BD Government for Spatial Planning and Property Affairs	x	x	x		x	x	x	
HEALTH PROTECTION	Food Safety Agency of BiH			x					
	Federal Ministry of Health	x	x	x					
	Ministry of Health and Social Welfare of RS	x	x	x			x		
	Department of BD Government for health and other services	x	x	x				x	
PLANNING OF TRADE	Federal Ministry of Trade	x							
	Ministry of Trade and Tourism of RS	x							
	Department of BD Government for Economic Development, Sports and Culture	x							
PLANNING OF TRANSPORT	Ministry of Communications and Transport of BiH				x				
	Federal Ministry of Transport and Communications				x				
	Federal Ministry of Interior				x				
	Ministry of Transport and Communication of RS				x				
	Ministry of Internal Affairs of RS				x				
	Department of the Government of BD for Public Affairs				x				
AGRICULTURE	Administration of Bosnia and Herzegovina for Plant Health Protection	x	x	x			x		
	Federal Ministry of Agriculture, Forestry and Water Management	x	x	x			x	x	x
	Ministry of Agriculture, Forestry and Water Management of RS	x	x	x			x	x	x
	Department of BD Government for Agriculture, Forestry and Water Management	x	x	x			x	x	x
OCCUPATIONAL SAFETY	Federal Ministry of Labour and Social Policy		x	x		x		x	
	Ministry of Labour, War Veterans and Disabled Persons' Protection		x	x		x		x	
	Department of Education of the Government of BD		x	x		x		x	
INDUSTRY	Federal Ministry of Energy, Mining and Industry		x	x					
	Ministry of Industry, Energy and Mining of RS		x	x					
	Department of BD Government for Economic Development, Sports and Culture		x	x					

AREA	Responsible institution	Trade	Production	Use	Transport	Unintentional production	Import/ export	Waste disposal	Inspection
	Life-cycle phases								
BORDER CROSSINGS	Ministry of Security of Bosnia and Herzegovina						x		x
	Indirect Taxation Authority						x		x
	Council of Ministers of BiH						x		
INSPECTION	Federal Administration for Inspection Affairs								x
	Republic Administration for Inspection Affairs of RS								x
	Inspectorate of BD								x

### 2.2.3 INTERNATIONAL OBLIGATIONS AND RESPONSIBILITIES OF BOSNIA AND HERZEGOVINA IN THE FIELD OF ENVIRONMENTAL PROTECTION

Conventions, protocols and treaties represent a universal mechanism for harmonization of legal practice in the areas of environmental protection, and represent an irreplaceable source of law. Bosnia and Herzegovina became a contracting party to several international conventions and agreements. International conventions and agreements ratified by BiH in accordance with state *Law on the procedure for the conclusion and implementation of international agreements* (Official Gazette of BiH, no. 29/00) are presented in Table 11.

Bosnia and Herzegovina, as a signatory to international sources, is required to:

- Ensure proper administrative and other measures for the implementation of ratified conventions, protocols and agreements;
- Align its national legislation with the accepted international standards in all areas with the ratified conventions, protocols and agreements.

BiH Constitution and the constitutions of the entities (the Federation of Bosnia and Herzegovina and Republika Srpska) include the obligation of the application of international standards in accordance with the conventions ratified by Bosnia and Herzegovina. BiH has taken (or is in the process of taking over) the obligation to enforce the obligations of the following conventions (it is either a Party of the same or by notification of succession has taken over from the predecessor State the duty of applying conventions):

Name of Convention/ Protocol	Place and year of adoption	Year of signature / ratification in BiH
Convention on Wetlands of International Importance especially as Waterfowl Habitat	Ramsar, 1971	Notification of succession in 1992
Convention on Long-Range Transboundary Air Pollution	Geneva, 1979	Notification of succession in 1993
Protocol on Long Term Financing of the Co-operative Programme for Monitoring and Evaluation of the Long-range Transmission of Air Pollutants in Europe (EMEP)	Geneva, 1984	Notification of succession in 1993
Convention on the International Maritime Organization	Geneva, 1948	Notification of succession in 1993
Convention on International Civil Aviation Annex 16 - Aircraft Noise	Chicago, 1944	Notification of succession in 1993
Convention for the Protection of the Ozone Layer	Vienna, 1985	Notification of succession in 1993
Protocol on Substances that Deplete the Ozone Layer	Montreal, 1987	Notification of succession in 1993
The Amendment to the Montreal Protocol Agreed by the Second Meeting of the Parties	London, 1990	Notification of succession in 2003
The Amendment to the Montreal Protocol Agreed by the Ninth Meeting of the Parties	Montreal, 1997	Notification of succession in 2003
UN Convention on the Law of the Sea	Montego Bay, 1982	Notification of succession in 1994
Convention for the Protection of the Mediterranean Sea Against Pollution	Barcelona, 1976	Notification of succession in 1992
Protocol Concerning Co-operation in Combating Pollution of the Mediterranean Sea by Oil and Other Harmful Substances in Cases of Emergency	Kuwait, 1978	Notification of succession in 1992

*Table 11: International instruments that BiH has signed / ratified*

Name of Convention/ Protocol	Place and year of adoption	Year of signature / ratification in BiH
Protocol for the Protection of the Mediterranean Sea against Pollution from Land-Based Sources (LBS)	Athens, 1980	Notification of succession in 1994
Protocol Concerning Mediterranean Specially Protected Areas	Geneva, 1982	Notification of succession in 1994
Protocol Concerning Specially Protected Areas and Biological Diversity in the Mediterranean Sea	Barcelona, 1995	Notification of succession in 1999
Convention Concerning the Protection of the World Cultural and Natural Heritage	Paris, 1972	Notification of succession in 1993
Convention Concerning the Use of White Lead in Painting	Geneva, 1921	Notification of succession in 1993
European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)	Geneva, 1957	Notification of succession in 1993
Protocol amending article 14 of the European Agreement concerning the International Carriage of Dangerous Goods by Road (ADR)	New York, 1975	Notification of succession in 1993
Convention on The Physical Protection of Nuclear Material	Vienna, 1979	Notification of succession in 1998
Convention on Fishing and Conservation of the Living Resources of the High Seas	Geneva, 1958	Notification of succession in 1994
Convention on the Territorial Sea and the Contiguous Zone	Geneva, 1958	Notification of succession in 1993
Convention on the Continental Shelf	Geneva, 1958	Notification of succession in 1994
Convention on High Seas	Geneva, 1958	Notification of succession in 1993
Convention Concerning The Protection Of Workers Against Occupational Hazards in the Working Environment due to Air Pollution, Noise And Vibration	Geneva, 1977	Notification of succession in 1993
Treaty on the Prohibition of the Emplacement of Nuclear Weapons and other Weapons of Mass Destruction on the Sea-Bed and the Ocean Floor and in the Subsoil thereof	London, Moscow, Washington D.C., 1971	Notification of succession in 1994
Treaty on the Non-Proliferation Of Nuclear Weapons	New York, 1968	Notification of succession in 1994
Convention on Early Notification of a Nuclear Accident	Vienna, 1986	Notification of succession in 1998
Convention on Assistance in the Case of a Nuclear Accident or Radiological Emergency	Vienna, 1986	Notification of succession in 1998
Convention on the Prohibition of the Development, Production and Stockpiling of Bacteriological (Biological) and Toxin Weapons, and on Their Destruction	London, Moscow, Washington D.C., 1972	Notification of succession in 1994
UN Framework Convention on Climate Change	Rio de Janeiro, 1992	Ratified in BiH in 2000
Kyoto Protocol	Kyoto, 1997	Ratified in BiH in 2007
International Plant Protection Convention	Rome, 1951	Ratified in BiH in 2003
Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal	Basel, 1989	Ratified in BiH in 2001
UN Convention on Biological Diversity	Rio de Janeiro, 1992	Ratified in BiH in 2002
Cartagena Protocol on Biosafety	Cartagena, 2000	Ratified in BiH in 2009
UN Convention to Combat Desertification in Those Countries Experiencing Drought and/or Desertification, Particularly in Africa	Paris, 1994	Ratified in BiH in 2002
Convention on Protection and Sustainable Use of the Danube River	Sofia, 1994	Ratified in BiH in 2005
Convention for the Establishment of the European and Mediterranean Plant Protection Organisation	Paris, 1955	Ratified in BiH in 2005
UNECE Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters	Aarhus, 1998	Ratified in BiH in 2008
Protocol on Pollutant Release and Transfer Register (PRTR)	Kiev, 2003	Signed in BiH in 2003
Convention On International Trade in Endangered Species Of Wild Fauna and Flora (CITES)	Washington D.C., 1973	Ratified in BiH in 2009
Convention on Environmental Impact Assessment in a Transboundary Context	Espoo, 1991	Ratified in BiH in 2009
Protocol on Strategic Environmental Assessment	Kiev, 2003	Ratified in BiH in 2003
Convention on the Conservation of European Wildlife and Natural Habitats	Bern, 1979	Ratified in BiH in 2008
Framework Agreement on the Sava River Basin	Kranjska Gora, 2002	Ratified in BiH in 2003
Convention on the Protection and Use of Transboundary Watercourses and International Lakes	Helsinki, 1992	Ratified in BiH in 2009
Amendments to Articles 25 and 26 of The Convention On The Protection And Use Of Transboundary Watercourses And International Lakes	Madrid, 2003	Ratified in BiH in 2010
Protocol on Water and Health of the Convention on the Protection and Use of Transboundary Watercourses and International Lakes	London, 1999	Ratified in BiH in 2011

Name of Convention/ Protocol	Place and year of adoption	Year of signature / ratification in BiH
Council of Europe Framework Convention on the Value of Cultural Heritage for Society	Faro, 2005	Ratified in BiH in 2009
Energy Charter Treaty	Lisbon, 1994	Ratified in BiH in 2001
Energy Charter Protocol on Energy Efficiency and related Environmental Aspects	Lisbon, 1994	Ratified in BiH in 2001
Convention on Safety and Health in Mines	Geneva, 1995	Ratified in BiH in 2010
Convention on Safety and Health in Agriculture	Geneva, 2001	Ratified in BiH in 2010
Convention Concerning Work in the Fishing Sector	Geneva, 2007	Ratified in BiH in 2010
Convention Concerning The Prevention of Major Industrial Accidents	Geneva, 1993	Ratified in BiH in 2010
European Landscape Convention	Florence, 2000	Ratified in BiH in 2010
Convention on the Prohibition of the Use, Stockpiling, Production and Transfer of Anti-Personnel Mines and on their Destruction	Oslo, 1997	Ratified in BiH in 1998
Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade	Rotterdam, 1998	Ratified in BiH in 2007
Convention On International Trade in Endangered Species Of Wild Fauna and Flora	Washington D.C, 1973	Ratified in BiH in 2009
Amendment to the Convention on International Trade in Endangered Species of Wild Fauna and Flora (Art. XI)	Bon, 1979	Ratified in BiH in 2009
European Outline Convention on Transfrontier Co-operation between Territorial Communities or Authorities	Madrid, 1980	Ratified in BiH in 2008
Convention concerning International Carriage of Goods by Rail	Bern, 1980	Ratified in BiH in 1996

## 2.2.4 LEGISLATION IN THE FIELD OF POPs CHEMICALS IN BOSNIA AND HERZEGOVINA

Table 12 provides an analysis of the key differences between the legislation in force in Bosnia and obligations to individual provisions of the Stockholm Convention.

Obligation under the Convention	Domestic legislation			
	Bosnia and Herzegovina	FBIH	RS	BD
<p><b>Article 3: MEASURES TO REDUCE OR ELIMINATE RELEASES FROM INTENTIONAL PRODUCTION AND USE:</b></p> <p><b>Paragraph 1, items (a) and (b):</b> Prohibition of production and use, and import and export of chemicals listed in Annex A and restricted production and use of chemicals listed in Annex B.</p>	<p>In BiH, legislation in the field of chemicals is adopted mainly at the level of the entities and Brčko District.</p> <p>However, legislation at the state level contains certain provisions related to POPs substances listed in Annex A and Annex B of the Convention. The state level legislation includes provisions related to pharmaceutical agents; pesticide residues in or on food and feed; sanitary safety of drinking water; maximum permissible concentration of toxic gases, vapours and aerosols in work areas and sites; prohibition of registration, import and circulation of active substances and phytopharmaceutical products whose circulation and use have been banned in the EU; maximum permitted levels for certain contaminants in foodstuffs. Annex 5 provides detailed information on management of POPs according to the regulations at the level of BiH, FBIH, RS and BD, for each of the POPs chemicals from the Stockholm Convention list.</p>	<p>The legislation in FBIH does not include all of the POPs substances listed in Annex A and Annex B of the Convention. The existing regulations only partially govern PCBs, and dioxins and furans.</p> <p>Annex 5 provides detailed information on management of POPs according to the regulations at the level of BiH, FBIH, RS and BD, for each of the POPs chemicals from the Stockholm Convention list.</p>	<p>All of the POPs substances listed in Annex A and Annex B of the Convention are regulated by the legislation in force in RS.</p> <p>Annex 5 provides detailed information on management of POPs according to the regulations at the level of BiH, FBIH, RS and BD, for each of the POPs chemicals from the Stockholm Convention list.</p>	<p>The legislation in BD does not include all of the POPs substances listed in Annex A and Annex B of the Convention. The existing regulations only partially govern dioxins and furans.</p> <p>Annex 5 provides detailed information on management of POPs according to the regulations at the level of BiH, FBIH, RS and BD, for each of the POPs chemicals from the Stockholm Convention list.</p>

*Table 12: Gap analysis – comparison between the obligations under the Convention and domestic legislation*

Obligation under the Convention	Domestic legislation			
	Bosnia and Herzegovina	FBIH	RS	BD
<p><b>Paragraph 2, items (a) and (b):</b> Chemicals listed in Annex A or B are imported only For the purpose of environmentally sound disposal For a use or purpose which is permitted for that Party under Annex A or Annex B. Chemicals listed in Annex A or B, for which specific exemptions are in effect, are exported only For the purpose of environmentally sound disposal, To a Party which is permitted to use that chemical under Annex A or Annex B; or to a State not Party to this Convention which has provided an annual certification to the exporting Party.</p>	<p><b>Import:</b> Only the plant health protection products that are on the List of Active Substances Contained in Phytopharmaceutical Agents Which can be Imported into BiH ("Official Gazette of BiH", No. 4/12) may be imported. Article 12 of the Law on Phytopharmaceutical Agents of BiH prescribes the procedure for the prohibition and restriction of circulation and use of phytopharmaceutical agents. The control of import of phytopharmaceutical agents is carried out by phytosanitary inspectors at border crossings for phytopharmaceutical agents. These agents may be imported only if a permit has been issued by the Plant Health Protection Directorate of BiH based on the consent of the competent authorities of the entities and Brcko District.</p>	<p>According to the Law on Circulation of Toxins that is in force in FBIH (Official Gazette of SFRY, No. 13/91), the circulation of toxins includes the import and export of toxins. The Law expressly prohibits the circulation and use of certain POPs substances, even though Article 5 generally prohibits the circulation of toxins which are determined to be harmful to human health or their environment during their use. According to the Law on Waste Management of FBIH, the import of waste for disposal purposes is prohibited. In terms of export, the Ministry of Environment and Tourism of FBIH issues approvals for the export of hazardous waste if certain conditions are met, including the condition of receipt of a written approval of the importing and transit countries, as well as the recipient's obligation to provide confirmation of the Federal Ministry that the disposal of waste has been carried out an environmentally acceptable way. Pursuant to the Regulation on Transboundary Movements of Waste (Official Gazette of FBIH, No. 07/11), an approval of the Ministry of Environment and Tourism of FBIH must be obtained for the export, import or transit of hazardous waste on the territory of the Federation. The draft Law on Chemicals in FBIH, which has not been adopted yet, and which is harmonized with the EU regulations, governs the conditions for the import and export of chemicals for which a prior consent procedure is required. The draft Law on Biocides in FBIH, which has not been adopted yet, regulates the conditions for the import of biocides.</p>	<p>The conditions for import and export of chemicals for which a prior consent procedure is prescribed are regulated by the Law on Chemicals (Official Gazette of RS, No. 25/09). The Law is based on the principle that manufacturers, importers and end-users should ensure that they manufacture, sell or use substances that do not have an adverse effect on human health or the environment. The conditions for import of biocides are regulated by the Law on Biocides (Official Gazette of RS, No. 37/09). This area is further regulated in more detail by the Regulation on the Conditions for Restriction and Prohibition of the Production, Circulation and Use of Chemicals (Official Gazette of RS, No. 100/10, 63/13). In addition, the Law on Plant Protection Products of RS (Official Gazette of RS, No. 52/10) stipulates the permit for import of plant protection products. According to the Law on Waste Management of RS (Official Gazette of RS, No. 111/13), the import of hazardous waste is prohibited. The transboundary movement of wastes is under the jurisdiction of the Ministry of Physical Planning, Construction and Ecology, which takes into account whether the waste intended for re-utilization or disposal will be handled in an environmentally sound manner. The Law on Transport of Hazardous Materials (Official Gazette of RS, No. 1/08, 117/11) provides that for the transport of toxic substances across the border of the territory of BiH and Republika Srpska, which are not registered in the Integral Inventory of Chemicals in accordance with the Law on Chemicals, it is necessary to obtain a permit issued by the Ministry of Health and Social Care with the consent of the Ministry of Internal Affairs, and the approval is not issued for toxic substances listed in the Integral Inventory of Chemicals. The Regulation on the Prior Notification Procedure and Prior Consent Procedure Based on Prior Notification During Import and Export of Certain Hazardous Chemicals and Products (Official Gazette of RS, No. 33/13) prescribes the procedure and the List of chemicals for the prior notification procedure, in accordance with Regulation 689 / 2008 (PIC Regulation).</p>	<p>According to the Law on Circulation of Toxins that is in force in FBIH (Official Gazette of SFRY, No. 13/91), the circulation of toxins includes the import and export of toxins. The Law expressly prohibits the circulation and use of certain POPs substances, even though Article 5 generally prohibits the circulation of toxins which are determined to be harmful to human health or their environment during their use.</p>

Obligation under the Convention	Domestic legislation			
	Bosnia and Herzegovina	FBiH	RS	BD
<p><b>Paragraph 3:</b> <i>Obligations relating to regulatory measures with the aim of preventing the production and use of new pesticides or new industrial chemicals which exhibit the characteristics of persistent organic pollutants.</i></p>	<p>Given the existing administrative arrangement at the state level, no preparations for the implementation of Regulation (EC) no. 1907/2006 concerning the Registration, Evaluation, Authorisation and Restriction of chemicals (REACH) are underway.</p>	<p>Registration, evaluation, authorization and restriction of chemicals are still not regulated in FBiH; however, the drafting of new laws and bylaws that will be harmonized with the legal sources of the EU in this area is underway.</p>	<p>The implementation of the REACH Regulation in RS has been enabled through the adoption of the Law on Chemicals (Official Gazette of RS, No. 25/09). This Law transposes the provisions of the REACH Regulation related to the registration of chemicals, information that must be submitted during registration, requirements for the Safety Data Sheet (SDS), restrictions and prohibitions related to certain chemicals, chemicals of concern, inventory of classified and labelled chemicals (harmonized with the CLP Regulation), the Chemical Safety assessment (CSA) and the Chemical Safety Report (CSR), the criteria for the identification of substances such as PBT or vPvB, and the availability of data. Legislation which prohibits the production and use of POPs substances has been adopted as well. The list of substances of concern and the list of restrictions and prohibitions regarding the production, placing on the market and use of certain hazardous substances, mixtures and products have been transposed entirely through bylaws which are updated on a regular basis.</p>	<p>Registration, evaluation, authorization and restriction of chemicals are still not regulated in BD.</p>

Obligation under the Convention	Domestic legislation			
	Bosnia and Herzegovina	FBIH	RS	BD
<p><b>Article 5: MEASURES TO REDUCE OR ELIMINATE RELEASES FROM UNINTENTIONAL PRODUCTION</b></p> <p><i>Each Party shall at a minimum take the following measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimization and, where feasible, ultimate elimination.</i></p> <p><b>Paragraph (a):</b> <i>Develop an action plan designed to identify, characterize and address the release of the chemicals listed in Annex C.</i></p>	<p>The domestic legislation at the state level does not prescribe the obligation of developing an Action Plan with the elements required under the Convention (estimates of current and planned releases, including the development and maintenance of source inventories and release estimates, assessment of the effectiveness of laws and policies for the management of such releases; strategies to fulfil these obligations, steps to promote education and awareness in relation to those strategies; review of these strategies every 5 years; schedule for implementation of the action plan). Nevertheless, there are certain instruments for identifying releases of chemicals listed in Annex C. Namely; there has been significant progress in BiH in the implementation of the EU Directive 2008/1/EC concerning integrated pollution prevention and control, particularly in the area of environmental licensing in the industry. Pollutant Release and Transfer Registers (PRTR) have been introduced in BiH (within the ministries responsible for the environmental protection in FBIH and RS), albeit still in their initial stage. The aim of establishing an electronic database of plants and pollution is a unified register of releases, transfer and disposal of pollutants and waste into the environment, in the form of a publicly accessible database of pollution and discharges of pollutants and waste into the environment (air, soil and water) from individual sources. It should be noted that the registers are still not operational as intended.</p>	<p>The domestic legislation at the level of FBIH does not prescribe the obligation of developing an Action Plan designed to identify, characterize and address the release of the chemicals listed in Annex C. According to the Law on Environmental Protection of FBIH (Official Gazette of FBIH, No. 33/03 and 38/09), the Federation is required to adopt the Federal Environmental Protection Strategy (with strategies for protection of waters, nature, air, and waste management) and the Environmental Action Plan for a period of ten years, whereas the cantons are required to adopt cantonal environmental protection plans (aligned with the Federal Strategy) for a period of five years. Also, according to the Law on Waste Management of FBIH (Official Gazette of FBIH, No. 33/03 and 72/09), the Federation is required to adopt the Waste Management Strategy for a period of six years, and the cantons are required to adopt their own waste management plans. Furthermore, according to the Law on Air Protection of FBIH (Official Gazette of FBIH, No. 33/03 and 4/10), the cantons are required, within two years, to adopt cantonal action plans for the protection of air quality in areas where the air quality limit values for one or more pollutants are exceeded. Such action plans include a description of the measures needed to reduce such pollution. Moreover, the Regulation on Registries of Plants and Pollution has been adopted in FBIH (Official Gazette of FBIH, No. 82/07). The Federal Ministry of Environment and Tourism, as the competent body for environmental protection in FBIH, is responsible for establishing and maintaining an electronic registry based on information provided by the competent authority and/ or plant operator. As of 2008, business entities are obliged to inform the public authorities on the release of pollutants, while environmental inspectors are entitled to sanction the companies and their management if they fail to comply with the regulations.</p>	<p>The domestic legislation at the level of RS does not prescribe the obligation of developing an Action Plan designed to identify, characterize and address the release of the chemicals listed in Annex C. The Law on Environmental Protection of RS (Official Gazette of RS, no. 71/12) prescribes the development of the Environmental Protection Strategy of RS with an Action Plan (for a period of six years) with the strategic documents on the protection of air and nature, and waste management, as well as the development of environmental protection plans of local self-government units that are aligned with the Strategy (for a period of six years). Furthermore, the Law on Air Protection of RS (Official Gazette of RS, no. 124/11) prescribes the development of air quality plans (when air pollution exceeds the effects of measures taken, or when the capacity of the environment is threatened, or there is constant air pollution in a certain area) and short-term action plans (when there is a risk that the levels of air pollutants exceed the concentrations of one or more hazardous to human health), based on the Air Protection Strategy. The Law on Waste Management of RS (Official Gazette of RS, No. 111/13) prescribes the development of regional and local plans for waste management, which include the type, quantity and origin of waste, special system of managing certain types of waste (including hazardous waste) and proposed measures. The RS has also adopted the Regulation on the Methodology and Manner of Keeping the Registry of Plants and Pollution (Official Gazette of RS, No. 92/07). The authority responsible for maintaining the Registry in the RS is the Ministry of Physical Planning, Construction and Ecology of RS. As of 2008, business entities are obliged to inform the public authorities on the release of pollutants, while environmental inspectors are entitled to sanction the companies and their management if they fail to comply with the regulations. Moreover, in RS, there are instruments for the registration of chemicals. Data on unintentionally released POPs are entered into the Inventory of Unintentionally Released POPs, kept by the republic administrative organization responsible for hydrological and meteorological affairs. Data on these substances are entered into the information system for air quality, which is an integral part of a unified information system for environmental protection.</p>	<p>The domestic legislation at the level of BD does not prescribe the obligation of developing an Action Plan designed to identify, characterize and address the release of the chemicals listed in Annex C. The Law on Environmental Protection of BD (Official Gazette of BD, No. 24/04, 19/07, 1/05 and 9/09) requires the District to develop the Strategic Plan for Environmental Protection (with strategies for protection of water, nature, air, and waste management) for a period of six years. Furthermore, the Law on Air Protection of BD (Official Gazette of BD, No. 25/04, 19/07, 1/05 and 9/09) requires the District to adopt action plans for the protection of air quality in areas where the air quality limit values for one or more pollutants are exceeded. Such action plans include a description of the measures needed to reduce such pollution. In addition, according to the Law on Waste Management of BD (Official Gazette of BD, No. 25/04, 19/07, 1/05, 2/08 and 9/09), the District is required to adopt the Waste Management Strategy for a period of six years as well as waste management plans. The competent BD Government department for environmental protection is required, according to the Law on Environmental Protection of BD, to keep a registry of plants and polluters in BD, containing information about the activities and facilities that threaten or may threaten the environment; however, the bylaw governing in detail the issues related to such a registry has not been adopted yet.</p>



Obligation under the Convention	Domestic legislation			
	Bosnia and Herzegovina	FBiH	RS	BD
<p><b>Paragraph (b):</b> Promote the application of available, feasible and practical measures that can expeditiously achieve a realistic and meaningful level of release reduction or source elimination.</p>		<p>The Environmental Protection Strategy in FBiH, in its operational objective 6.1.3., prescribes the reduction of air pollution caused by the industry - technological facilities. This operational objective entails the following measures: promotion of cleaner production; establishment of environmental management systems in certain industries (EMAS I); management of chemicals that can pollute the air; improving the system of periodic checks and continuous monitoring of emissions; exclusion from use of substances that deplete the ozone layer. The Regulation on Limit Values of Emissions of Pollutants into the Air (Official Gazette of FBiH, No. 12/05) sets the limit values of emissions of pollutants into the air from industrial stationary sources of pollution, including organic pollutants. Furthermore, the Regulation on the Conditions for the Operation of Waste Incineration Plants (Official Gazette of FBiH, No. 12/05, 102/12) regulates the working conditions and measures to control emissions into the air, soil, surface and groundwater and the risks to human health from plants for incineration and co-incineration of solid or liquid waste. The Law on Environmental Protection of FBiH (Official Gazette of FBiH, No. 33/03 and 38/09) provides that the measures, technologies and other techniques for preventing or, if not possible, reducing emissions from the plants must be considered in the course of issuing environmental permits. In addition, the Law on Air Protection of FBiH (Official Gazette of FBiH, No. 33/03 and 4/10) lays down the obligation for each source of emissions to reduce the emission of pollutants into the air to a minimum with the use of best available technologies in the stages of planning, designing, commissioning and operation of the plants, and prescribes that the emission limit values must not be exceeded.</p>	<p>The Air Protection Strategy of RS, developed in 2007 by the Ministry of Physical Planning, Construction and Ecology of RS, provides for the reduction of persistent organic pollutants by 3-5% (primarily polycyclic aromatic hydrocarbons, hexachlorobenzene and dioxins / furans). Furthermore, the Decree on Limit Values of Emissions of Pollutants into the Air of RS (Official Gazette of RS, No. 39/05) sets the emission limit values of pollutants into the air from industrial stationary sources of pollution, including organic pollutants. The Regulation on the Conditions for the Operation of Waste Incineration Plants (Official Gazette of RS, No. 39/05) regulates this issue in the same manner as defined by the mentioned Regulation in FBiH. In addition, the Law on Environmental Protection of RS (Official Gazette of RS, no. 71/12) provides that measures to prevent or, where that is not practicable, reduce emissions into air, water and soil, and prevent waste must be imposed in the process of issuing environmental permits. Furthermore, the Law on Air Protection of RS (Official Gazette of RS, No. 124/11) stipulates the obligation to implement measures to prevent and reduce air pollution.</p>	<p>The Regulation on Limit Values for Emissions of Pollutants into the Air (Official Gazette of BD, No. 30/06) sets the emission limit values for air pollutants, defines the measures for the protection of air against pollution (emissions) and the measures to eliminate the causes of the harmful effects of air pollution (emissions) on human health and preserve the value of the environment. The Regulation on the Conditions for the Operation of Waste Incineration Plants (Official Gazette of BD, No. 30/06) regulates this issue in the same manner as defined by the mentioned Regulation in FBiH. The Law on Environmental Protection of BD (Official Gazette of BD, No. 24/04, 19/07, 1/05 and 9/09) regulates the obligation to consider measures to reduce releases or eliminate the source of pollution in the same manner as the law in FBiH. The Law on Air Protection of BD (Official Gazette of BD, No. 25/04, 19/07, 1/05 and 9/09) stipulates the same obligations for emission sources as the law in FBiH.</p>

Obligation under the Convention	Domestic legislation			
	Bosnia and Herzegovina	FBIH	RS	BD
<p><b>Paragraph (d):</b> 1) Promote and, in accordance with the implementation schedule of its action plan, require the use of best available techniques for new sources within source categories which a Party has identified as warranting such action in its action plan, with a particular initial focus on source categories identified in Part II of Annex C; 2) the requirement to use best available techniques for new sources in the categories listed in Part II of that Annex shall be phased in as soon as practicable but no later than four years after the entry into force of the Convention for that Party; 3) promote the use of best environmental practices.</p>		<p>The Law on Environmental Protection of FBIH (Official Gazette of FBIH, No. 33/03 and 38/09) promotes the application of "best available technologies" in using the environment, which are defined as the most effective and advanced stage of development of activities and their modes of operation which indicates practical suitability of particular technologies (for ensuring emission limit values) in order to prevent and, where that is not practicable, reduce emissions into the environment.</p>	<p>The Law on Environmental Protection of RS (Official Gazette of RS, No. 71/12) defines and promotes the application of best available techniques in the same manner as in FBIH.</p>	<p>The Law on Environmental Protection of BD (Official Gazette of BD, No. 24/04, 19/07, 1/05 i 9/09) defines and promotes the application of best available techniques in the same manner as in FBIH.</p>
<p><b>Article 6</b> <b>MEASURES TO REDUCE OR ELIMINATE RELEASES FROM STOCKPILES AND WASTES:</b></p> <p>Obligations:</p> <ul style="list-style-type: none"> <li>- Develop appropriate strategies for identifying Stockpiles consisting of or containing chemicals listed either in Annex A or Annex B, and Products and articles in use and wastes consisting of, containing or contaminated with a chemical listed in Annex A, B or C;</li> <li>- Identify, on the basis of the mentioned strategies, the stockpiles consisting of or containing chemicals listed either in Annex A or Annex B;</li> <li>- Manage stockpiles in a safe, efficient and environmentally sound manner;</li> <li>- Take appropriate measures so that such wastes are managed as defined in paragraph 1, item (d) (handling, collection, transport, storage and disposal).</li> <li>- develop appropriate strategies for identifying sites contaminated by chemicals listed in Annex A, B or C; if remediation of those sites is undertaken it shall be performed in an environmentally sound manner.</li> </ul>		<p>The domestic legislation does not provide for the obligation to develop strategies for identifying stockpiles and wastes. The Law on Waste Management of FBIH (Official Gazette of FBIH, No. 33/03 and 71/09) prescribes the periodic development of waste management strategies but does not specify separate waste streams to be defined by such strategies, nor the manner of identifying stockpiles containing POPs chemicals. With regard to the requirement set out by the Convention concerning waste management in the manner described in Article 6 of the Convention, the Law on Waste Management provides a basis for the proper management of hazardous waste.</p>	<p>The Law on Waste Management of RS (Official Gazette of RS, No. 111/13) regulates the mentioned obligations in the same manner as in FBIH.</p>	<p>The Law on Waste Management of BD (Official Gazette of BD, No. 25/04, 19/07, 1/05, 2/08 and 9/09) regulates the mentioned obligations in the same manner as in FBIH.</p>

Obligation under the Convention	Domestic legislation			
	Bosnia and Herzegovina	FBiH	RS	BD
<p><b>Article 11</b> <b>RESEARCH, DEVELOPMENT AND MONITORING:</b> <i>Paragraph 1: The Parties shall, within their capabilities, at the national and international levels, encourage and/or undertake appropriate research, development, monitoring and cooperation pertaining to persistent organic pollutants and, where relevant, to their alternatives and to candidate persistent organic pollutants, including on their:</i></p> <p>(a) Sources and releases into the environment; (b) Presence, levels and trends in humans and the environment; (c) Environmental transport, fate and transformation; (d) Effects on human health and the environment; (e) Socio-economic and cultural impacts; (f) Release reduction and/or elimination; and (g) Harmonized methodologies for making inventories of generating sources and analytical techniques for the measurement of releases.</p>	<p>Monitoring is defined by the Law on Food, the Law on Phytopharmaceutical Agents, and the Law on Plant Health Protection of BiH.</p>	<p>According to the Law on Environmental Protection of FBiH (Official Gazette of FBiH, No. 33/03 and 38/09), the Federal Ministry of Environment and Tourism is required to establish an environmental information system and to mandate the monitoring of the state of the environment, measurement activities, collection, processing and recording of data on environmental use and pollution.</p> <p>The information system is established and organized on the basis of the territorial population density and intensity of use of the environment, in the form of periodic reports on the state of the environment in such a manner that allows:</p> <ul style="list-style-type: none"> <li>- The determination of the quantitative and qualitative changes in environmental conditions that have arisen as a result of use, and comparison at the international level so as to assess them along with social and economic data, as well as from the point of impact on the health of the population;</li> <li>- The determination of the causes of environmental impacts with sufficient accuracy including detailed representations that are needed to determine the cause-and-effect relationships in relation to damage;</li> <li>- Predicting the risks to the environment as soon as possible;</li> <li>- Taking of measures defined by regulations and other measures prescribed by the competent authorities;</li> <li>- Using the system for planning purposes.</li> </ul> <p>The Federal authorities responsible for the areas of water management, meteorology, pedology, geology, nature protection, statistics and other administrative organizations are required to ensure the collection, processing and recording of relevant data and information, in particular data on environmental use and pollution, and submit such data and information to the Ministry, as well as other competent authorities at the national level, and international institutions. Furthermore, users of the environment are required to measure environmental use and pollution caused by their activities in the manner defined by special regulations, confirm such measures and record them in accordance with the users' technical capabilities and allow the competent authorities access to the data.</p> <p>This Law defines the obligations of operators of plants and facilities as well. In addition, monitoring is regulated by the laws on air and water protection, and waste management.</p>	<p>The Law on Environmental Protection of RS (Official Gazette of RS, No. 71/12) prescribes the development of planning documents in the field of environmental protection which, inter alia, define the basis of environmental monitoring and basis for directing scientific research activities and education in the field of environmental protection. Furthermore, the requests for obtaining environmental permits must specify the measures planned for monitoring emissions into the environment.</p> <p>In addition, monitoring is regulated by the laws on air and water protection, and waste management.</p>	<p>The Law on Environmental Protection (Official Gazette of BD, No. 24/04, 19/07, 1/05 and 9/09) prescribes the establishment of system of information, monitoring and data collection in the same manner as in FBiH. The competent authority for the establishment of such a system is the Government of BD.</p>

## 2.2.5 MANAGEMENT OF POPs CHEMICALS

### 2.2.5.1 Bosnia and Herzegovina

In Bosnia and Herzegovina, according to the *Law on Phytopharmaceutical Agents* (Official Gazette of BiH, no. 49/04), phytopharmaceutical agents (PPA) in their final form are active substances<sup>46</sup> and preparations, intended for:

- protection of plants and crop farming from pests and prevention of their damaging effects;
- influencing the vital plant processes, different from feeding,
- maintenance of plant products, unless they are regulated by different legislation;
- prevention of undesired plants, parts of plants, deterrence or prevention of undesired plant growth.

The List of Active Substances Permitted for Use Phytopharmaceutical Agents in BiH issued by the BiH Plant Health Protection Administration does not contain any of the POPs pesticides.

The *Decision on the Prohibition of Registration, Import and Trade of Active Substances and Phytopharmaceutical Agents Containing Active Substances Whose Circulation or Use is Prohibited in the European Union* (Official Gazette of BiH, no. 55/08, 35/10, 79/10, 63/11) adopted on the basis of the Law on PPA of BiH, contains the following POPs substances (the date until which plant protection products containing the active substance may be traded within the territory of BiH is 01/10/2008):

- Endosulfan
- Lindane

It should be noted that in 2014 this decision was repealed by the *Decision on Repealing of the Decision which Prohibits Registration, Import and Transport of Certain Active Substances* (Official Gazette of BiH, no.22/14). With the entry into force of this decision, all active substances that are not on the *List of Active Substances Permitted for Use Phytopharmaceutical Agents in Bosnia and Herzegovina*, issued by the BiH Plant Health Protection Administration in accordance with Article 29 of the *Law on Phytopharmaceutical Agents* (Official Gazette of BiH, no. 49/04), are considered to be banned for use in phytopharmaceutical agents in BiH.

Article 12 of the *Law on Phytopharmaceutical Agents of BiH* (Official Gazette of BiH, no. 49/04) defines the procedure for prohibiting and limiting the circulation and use of PPA in Bosnia and Herzegovina. Import of PPA is controlled by phytosanitary inspectors at the border crossings for PPA circulation. PPA may be imported only with a permit issued by the Plant Health Protection Administration of BiH on the basis of a consent issued by the competent entity level and Brčko District level authorities.

In 2007, Bosnia and Herzegovina ratified the *Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade*, which aims to promote shared responsibilities and cooperative efforts among Parties in the international trade of certain hazardous chemicals and pesticides<sup>47</sup> in order to protect human health and the environment from potential harm and to contribute to the environmentally sound use of those chemicals, by facilitating exchange of information about their characteristics, defining the national decision-making processes on their import and export, and disseminating these decisions to Parties. The Rotterdam Convention encompasses pesticides and industrial chemicals that have been banned or severely restricted by Parties for health and environmental reasons and which have been notified by Parties for inclusion in the prior informed consent procedure. The Convention regulates 40 chemicals, including 29 pesticides among which 10 POPs pesticides (aldrin, chlordane, DDT, dieldrin, endosulfan, HCH, heptachlor, hexachlorobenzene, lindane (gamma HCH), toxaphene).

On the basis of the provisions of the Convention, Bosnia and Herzegovina has issued a decision on not accepting the import of all 10 POPs pesticides. The Plant Health Protection Administration of BiH has been appointed, as a state level institution, for the coordination of the Convention's implementation in BiH.

<sup>46</sup> Active substances, according to the Law on PPA, are substances or micro-organisms, including viruses which have general or special effect on pests and plants, their individual parts or plant products.

<sup>47</sup> This Convention covers: (a) banned or strictly restricted chemicals and (b) severely hazardous pesticide formulations.

*Regulation on the Road Transport of Hazardous Materials* (Official Gazette of SFRY, no. 82/90) contains provisions relating to the preparation of hazardous materials for transportation, vehicles for the transport of hazardous materials, documents required for their transport, special security measures, the procedure in case of traffic accidents, the measures of authorities responsible for issuing approvals for the transport of hazardous materials and monitoring measures in their transport. This Regulation is still in force in the Federation of BiH and Brčko District, whereas Republika Srpska adopted a new Law on the Transport of Hazardous Materials in 2008 which was amended in 2011.

At the level of BiH, the *Regulation on the Procedure for Stockpiles of Plant Protection Products whose Circulation and Use are Banned* (Official Gazette of BiH, no. 58/09) prescribes the procedure of disposing of stockpiles of plant protection products and phytopharmaceutical agents. According to the Regulation, legal entities and natural persons in possession of such products are obliged to hand over these products to the legal entity dealing with the disposal and export of hazardous waste and licensed by the competent environmental authorities in FBiH, RS and BD, including both products out of circulation and in circulation.

In 2000, Bosnia and Herzegovina ratified the *Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal*, whose objective is to control the transboundary movements of hazardous wastes and control the disposal of hazardous wastes, in order to protect human health and the environment against the adverse effects of the generation and poor management of hazardous and other wastes. According to this Convention, import and export of wastes are allowed only where it is perceived to be in accordance with the principles of environmentally sound management. Waste containing POPs substances is covered by this Convention due to its hazardous characteristics. In accordance with the Basel Convention, it is necessary to ensure that the transboundary movement of hazardous wastes and other wastes is reduced to a minimum, in line with the environmentally sound waste disposal, and which is carried out in a way that human health and environment are protected from harmful effects of such a transport. Under the Convention, hazardous waste can be exported only to countries that have not banned the import of hazardous waste with the written consent of the competent institution of the importing country.

According to the waste management legislation in the FBiH, RS and BD, import of waste in BiH for the purpose of disposal is prohibited.

### 2.2.5.2 Federation of BiH

In the Federation of BiH, old SFRY laws are still in force. The *Law on Putting into Circulation of Toxins* (Official Gazette of SFRY, no. 13/91) regulates the circulation and use of POPs pesticides (which have been defined as toxins in this Law), and in accordance with the *Law on Protection of Plants Against Diseases and Pests* (Official Gazette of RBiH, no. 2/92, 13/94) the Federal Ministry of Agriculture, Water Management and Forestry issues decisions authorizing the placing of plant protection products on the domestic market.

In the Federation of BiH, the Law on chemicals, as well as regulation that limits or prohibits the production, trade and use of certain chemicals, have not been adopted yet. In 2012, the Government of the Federation of BiH prepared the following draft laws:

- Draft Law on Chemicals (27/12/2012)
- Draft Law on Biocides (27/12/2012)
- Draft Law on Transport of Dangerous Materials (15/03/2012)

The above-mentioned draft laws are still in parliamentary procedure and have not yet been adopted.

Based on the *Law on Putting into Circulation of Toxins* (Official Gazette of SFRY, no. 13/91) and the *Law on Transport of Hazardous Materials* (Official Gazette of SFRY, no. 27/90) which are still in force, the Federal Ministry of Health (FMH) issues the approval on the import of toxins into the Federation of BiH.

The *Law on Putting into Circulation of Toxins*, in its Article 4, explicitly prohibits the circulation and use of the following POPs pesticides (defined by this Law as toxins):

- Aldrin
- Dieldrin

- Hexachlorocyclohexane
- Heptachlor
- Chlordane

Article 5 of the Law stipulates that the circulation of toxins found to be harmful to human health and the environment is prohibited.

The Federal Ministry of Agriculture, Water Management and Forestry is responsible for issuing permits for the import of plant protection products in accordance with the *Law on Protection of Plants Against Diseases and Pests* (Official Gazette of RBiH, no. 2/92, 13/94) and issuing decisions authorizing the placing of plant protection products on the domestic market. Only the plant protection products which are on the *List of Active Substances Contained in Phytopharmaceutical Agents Which May Be Imported into BiH* (Official Gazette of BiH, no. 4/12) may be imported. The List is regularly reviewed and is harmonized with EU Decisions.

The Federal Ministry of Agriculture, Water Management and Forestry is responsible only for the approval of import and trade of plant protection products used in primary agricultural production. In case of import of toxins intended for public and communal sanitary measures using repellents, rodenticides and similar preparations not used in agriculture, the responsible authority is the Federal Ministry of Health.

The Federal Ministry of Agriculture, Water Management and Forestry prepares annual analyses of imported quantities of pesticides on the basis of issued permits.

In the Federation of BiH, waste management<sup>48</sup> (including hazardous waste) is regulated through:

- The *Law on Waste Management in FBiH* (Official Gazette of FBiH, no. 33/03, 71/09) which regulates waste categories and all types of activities in waste management, operations and facilities;
- The *Regulation on Waste Categories with Lists* (Official Gazette of FBiH, no. 9/05) which defines waste categories with lists, according to the characteristics of waste and the activities generating waste, as well as the obligation of their use;
- The *Regulation on the Treatment of Hazardous Waste Not on the Waste List or Whose Content is Unknown* (Official Gazette of FBiH, no. 33/03);
- The *Decree on Selective Collection, Packaging and Labelling of Waste in FBiH* (Official Gazette of FBiH, no. 38/06) which prescribes the measures for selective collection, identification, storing, packaging and labelling of waste prior to disposal, transport or transfer to another entity authorized for reuse or disposal of components, in a manner that protects human health, the environment and encourages the reuse of components and reuse of waste. This Decree covers used oils containing polychlorinated biphenyls / polychlorinated terphenyls (PCB/PCT);
- The *Regulation on Transboundary Waste Movements* (Official Gazette of FBiH, no. 07/11).

According to the *Regulation on Transboundary Waste Movements* (Official Gazette of FBiH, no. 07/11), shipments of waste in transboundary movements on the territory of FBiH must be accompanied by documents defined by the Law and this Regulation, from the moment of shipment in the country of export, through the transit countries until its final disposal or treatment in the country of import. The Regulation defines the border crossings through which transboundary waste movements are allowed. Each shipment of hazardous waste that is imported, exported or transited through the territory of FBiH must be accompanied by a consent issued by the Federal Ministry of Environment and Tourism on clearance of export, import or transit of hazardous waste and the Notification on Transboundary Movement. Furthermore, the sender or transporter of hazardous waste is obliged to notify the Federal Ministry of Environment and Tourism and the Federal Ministry of Finance – Customs Administration at the relevant border crossing about each shipment of hazardous waste three days prior to its shipment, whereas the importer of hazardous waste is obliged, within three days from taking over the waste, to confirm the receipt of such waste to the Federal Ministry of Environment and Tourism and the exporter.

<sup>48</sup> The objective of the Law on Waste Management of FBiH (as well as RS and BD) is encouraging and ensuring the most important conditions for the purpose of preventing the generation of waste, treatment of waste for re-use and recycling, separating the raw materials and their use for energy production and the safe disposal of waste.

### 2.2.5.3 Republika Srpska

In Republika Srpska, in accordance with the *Law on Biocides* (Official Gazette of RS, no. 37/09), biocide products<sup>49</sup> may be placed on the market only after obtaining the authorization of the Ministry of Health and Social Welfare of RS. This means that biocides may be placed on the market and used for intended purposes only if the Minister of health and social welfare issues a permit for placing of the biocide on the market or if the biocide has been registered in the Technical Dossier Submission Program (which contains basic data on legal entities, biocides and active substances). For biocide products are defined permitted and prohibited active substances by the *Regulation on the List of Active Substances that are Permitted in Biocide Products* (Official Gazette of RS, no. 32/10, 72/11 and 85/12) and the *Regulation on the List of Active Substances Which are not Permitted in Biocide Products* (Official Gazette of RS, no. 32/10, 74/11 and 85/12), according to which POPs substances are not permitted.

According to the *Law on Plant Protection Products* (Official Gazette of RS, no. 52/10), plant protection products may be produced, marketed and used in the territory of RS if are registered and provided a declaration and guidance for the application in accordance with this law and the regulations thereunder, as well as those that have been registered in accordance with the relevant regulations of the FBiH and the active substance or basic substance containing these substances can be produced and marketed, if it is registered in the List of approved substances (list of active substances or basic substances approved for use in plant protection products, which aligns with the list of active substances and basic substances on the territory of the EU). Pesticides are registered by the Ministry of Agriculture, Forestry and Water Management upon the proposal of the Commission for plant protection products, and at the request of the manufacturer or authorized representative.

The *Law on Chemicals of RS* (Official Gazette of RS, no. 37/09), through the *Regulation on Conditions for Restriction and Prohibition of Production, Putting into Circulation and Use of Chemicals*<sup>50</sup>(Official Gazette of RS, no. 100/10, 63/13) prescribes the limits and prohibitions of production, placing on the market and using of chemicals, the prohibited and permitted uses, as well as other conditions for the production, marketing and using of substances<sup>51</sup>, mixtures and products that pose an unacceptable risk to human health or an environmental risk. Annex 2, Part A of this Regulation ("List of Prohibited POPs Substances from the Stockholm Convention"), prohibits the following POPs pesticides:

- Aldrin (no exceptions)
- Chlordane (no exceptions)
- Dieldrin (no exceptions)
- Endrin (no exceptions)
- Heptachlor (no exceptions)
- Hexachlorobenzene (no exceptions)
- Pentachlorobenzene (no exceptions)
- Mirex (no exceptions)
- Toxaphene (no exceptions)
- Chlordecone (no exceptions)
- Hexachlorocyclohexane (HCH), including Lindane (no exceptions)
- Endosulfan (noting that it is permitted to place on the market and use products containing endosulfan until 31 December 2013 if they were produced or were in use prior to the entry into force of the mentioned Regulation)
- DDT (no exceptions)
- Polychlorinated biphenyls (PCB) noting that the use of devices in use is allowed if it is not contrary to the conditions set out in the regulations governing the disposal of polychlorinated biphenyls and polychlorinated terphenyls

<sup>49</sup> According to the Law on Biocides of RS, biocide products are active substances or preparations containing one or more active substances, prepared in the form supplied to the users, and intended to destroy, deter, render harmless, prevent the action of or exert a controlling effect on harmful organisms by chemical or biological means.

<sup>50</sup> According to the Law on Chemicals of RS, chemicals are substances and chemical preparations containing chemical substances.

<sup>51</sup> According to the Law on Chemicals of RS, chemical substances are chemical elements or their compounds in their natural state or obtained in the production process, including additives necessary for the preservation of their stability and impurities arising out of the production process, and excluding solvents which may be isolated without influencing the stability of the substance or changes to its composition. According to the same Law, a chemical preparation is a mixture or solvent composed of two or more substances.

- PFOS with the following exceptions and remarks:
  1. The production, placing on the market and use of substances and mixtures containing PFOS as an impurity in concentrations equal to or less than 10 mg/kg (0.001 % m/m<sup>52</sup>) is allowed.
  2. The production, placing on the market and use of semi-products, products or parts thereof, if the concentration of PFOS is less than 0.1 % (m/m), calculated on the basis of structurally or micro structurally different parts containing PFOS, or if the amounts of PFOS in textiles and other coated materials is less than 1 µg/m<sup>2</sup> of coated materials.
  3. PFOS containing products placed on the market prior to 15 Oct 2010 may continue to be used.
  4. The production and placing on the market of PFOS is allowed if the amount of these substances discharged into the environment is minimized, and solely for specific purposes:
    - a. Until 26 Aug 2015 for wetting products in controlled electroplating processes,
    - b. For photo resistant or antireflection coatings in photolithography processes,
    - c. For photographic coatings applied to film, paper or printing plates,
    - d. For products for blur suppression in the process of non-decorative (VI-valence) chromium plating in closed systems,
    - e. For hydraulic fluids in aviation.

A report on the progress of PFOS elimination for the purposes mentioned in items 4a), 4b), 4c) and 4d) is submitted to the Ministry of Health and Social Welfare of RS every fourth year, until the 1<sup>st</sup> of March.

5. In accordance with new information about the details and the use of safer alternatives of substances and technologies available for use:
  - i. The use of PFOS shall be terminated as soon as the use of safer alternatives is technically and economically feasible;
  - ii. Exceptions may be extended solely for the main purposes for which there are no safer alternatives or where measures taken to search for safer alternatives are reported;
  - iii. Release of PFOS into the environment shall be minimized by applying the Best Available Techniques (BAT).

European or BAS standards, once they are adopted, shall be used as analytical methods for demonstrating the compliance of substances, mixtures and products with the requirements mentioned in items 1 and 2.

According to the same Regulation, PBDE and HBB are regulated as follows:

*Table 13:  
Restrictions and prohibitions in the production, circulation and use of POP-BDE and HBB in Republika Srpska*

Substance	Exceptions and remarks
Hexabromodiphenylether, C <sub>12</sub> H <sub>4</sub> Br <sub>6</sub> O	<ol style="list-style-type: none"> <li>1. The production, placing on the market and use of substances, mixtures, products or parts of products used as flame retarders containing hexabromodiphenyl ether as an impurity in concentrations equal to or less than 10 mg/kg (0.001 % m/m) is allowed.</li> <li>2. The production, placing on the market and use of mixtures and products produced entirely or partially from recycled materials or waste that is ready for reuse, containing hexabromodiphenyl ether in concentrations less than 0.1% (m/m), is allowed.</li> </ol> Restrictions set out in item 1 do not apply to electrical and electronic equipment governed by other regulations. <ol style="list-style-type: none"> <li>3. Products that were in use prior to the entry into force of this Regulation which contain hexabromodiphenyl ether may continue to be used.</li> </ol>
Heptabromodiphenylether, C <sub>12</sub> H <sub>3</sub> Br <sub>7</sub> O	<ol style="list-style-type: none"> <li>1. The production, placing on the market and use of substances, mixtures, products or parts of products used as flame retarders containing heptabromodiphenyl ethers an impurity in concentrations equal to or less than 10 mg/kg (0.001 % m/m) is allowed.</li> <li>2. The production, placing on the market and use of mixtures and products produced entirely or partially from recycled materials or waste that is ready for reuse, containing heptabromodiphenyl ether in concentrations less than 0.1% (m/m), is allowed.</li> </ol> Restrictions set out in item 1 do not apply to electrical and electronic equipment governed by other regulations. <ol style="list-style-type: none"> <li>3. Products that were in use prior to the entry into force of this Regulation which contain heptabromodiphenyl ether may continue to be used.</li> </ol>
Hexabromobiphenyl	/

<sup>52</sup> Percentage of total mass of substance



Substance	Exceptions and remarks
Tetrabromodiphenyl ether, C <sub>12</sub> H <sub>6</sub> Br <sub>4</sub> O	1. The production, placing on the market and use of substances, mixtures, products or parts of products used as flame retarders containing tetrabromodiphenyl ethers an impurity in concentrations equal to or less than 10 mg/kg (0,001 % m/m) is allowed. 2. The production, placing on the market and use of mixtures and products produced entirely or partially from recycled materials or waste that is ready for reuse, containing tetrabromodiphenyl ether in concentrations less than 0.1% (m/m), is allowed. Restrictions set out in item 1 do not apply to electrical and electronic equipment governed by other regulations. 3. Products that were in use prior to the entry into force of this Regulation which contain tetrabromodiphenyl ether may continue to be used.
Pentabromodiphenylether, C <sub>12</sub> H <sub>5</sub> Br <sub>5</sub> O	1. The production, placing on the market and use of substances, mixtures, products or parts of products used as flame retarders containing pentabromodiphenyl ether as an impurity in concentrations equal to or less than 10 mg/kg (0,001 % m/m) is allowed. 2. The production, placing on the market and use of mixtures and products produced entirely or partially from recycled materials or waste that is ready for reuse, containing pentabromodiphenyl ether in concentrations less than 0.1% (m/m), is allowed. Restrictions set out in item 1 do not apply to electrical and electronic equipment governed by other regulations. 3. Products that were in use prior to the entry into force of this Regulation which contain pentabromodiphenyl ether may continue to be used.

In Republika Srpska, the *Law on Transport of Hazardous Materials* (Official Gazette of RS, no. 1/08, 117/ 11) stipulates that it is prohibited to dispose of hazardous materials<sup>53</sup> of foreign origin on the territory of RS. The transport of hazardous materials across the BiH borders and the territory of RS, which are not registered in the Integral Chemicals Inventory in accordance with the *Law on Chemicals* (Official Gazette of RS, no. 25/09), requires the approval of the Ministry of Health and Social Protection with the consent of the Ministry of Internal Affairs. Approvals are not issued if the toxic material is registered in Integral Chemicals Inventory. The transport of hazardous materials in internal circulation requires the approval of the competent organizational unit of the Ministry of Internal Affairs, according to the place of departure. Approvals are not issued if the toxic material is not registered in the Integral Chemicals Inventory.

According to the Law, the following principles are applied in the transport of hazardous materials:

1. The European Agreement concerning the International Carriage of Dangerous Goods by Road is applied in road transport;
2. The Convention concerning International Carriage by Rail is applied in railway transport;
3. The European Agreement concerning the International Carriage of Dangerous Goods by Inland Waterways is applied in inland waterway transport;
4. Annex 18 of the Convention on International Civil Aviation and the Technical Instructions of the International Civil Aviation Organization for the Safe Transport of Dangerous Goods by Air are applied in air transport;
5. The regulations of the Universal Postal Union are applied in postal transport.

Import and export of hazardous chemicals and biocides are controlled by the Republic Inspection Directorate of RS through the Health Inspection on the basis of the *Law on Chemicals* (Official Gazette of RS, no. 37/09) and the *Law on Biocides* (Official Gazette of RS, no. 25/09). The importer of hazardous chemicals and products registered in the Integral Chemicals Inventory is obliged, prior to customs clearance, to submit a request to the health inspector for inspection of the chemicals and products. Upon the performed inspection, the health inspector submits to the Ministry of Health and Social Protection a report on the performed inspection. In case the inspector ascertains that the conditions for import or export of the chemicals have not been met, the inspector prohibits their further circulation and notifies the Ministry. Under the *Law on biocides* (Official Gazette of RS, no. 37/09), biocides can be imported by permit holders for placing biocide products on the market, holders of temporary permits, decision on registration in Program, as well as on the basis of consent on the use of biocides solely for the purposes of scientific research and development and product and process - oriented research and development i.e. permission for the use of biocides for scientific research purposes or for purposes of development.

<sup>53</sup> According to the Law, "hazardous materials" include the raw materials from which hazardous materials and waste consist of – if they have the characteristics of these materials.

The import and export of certain chemicals and products are defined by the *Regulation on the Procedure of the Prior Notification Process and the Consent Issuing Process Based on Prior Notification During Import and Export of Certain Hazardous Chemicals and Products* (Official Gazette of RS, no. 33/13), in accordance with Regulation (EC) 689/2008 concerning the export of import of dangerous chemicals.

According to the *Law on Plant Protection Products* (Official Gazette of RS, no. 52/10), circulation of plant protection products (including import and export) may be carried out by companies and entrepreneurs registered in the Registry of Distributors and Importers of Plant Protection Products, kept by the Ministry of Agriculture, Forestry and Water Management. Plant protection products which are being imported must be registered in accordance with this law, and the active substance or basic substance to be imported must be entered in the List of approved substances that are used for the production of registered pesticides. Such agents and substances may be imported only through border crossings where exists organized phytosanitary inspection and which meet the technical and hygienic working conditions.

Import and export of plant protection products are controlled by the Republic Inspection Directorate of RS by phytosanitary inspectors.

In Republika Srpska, waste management (including hazardous waste) is regulated through:

- The *Law on Waste Management in RS* (Official Gazette of RS, no. 53/02, 65/08) which regulates waste categories and all types of activities in waste management, operations and facilities;
- The *Regulation on Waste Categories with Catalogue* (Official Gazette of RS, no. 39/05).

Republika Srpska has not yet passed the Regulation on Transboundary Movement of Waste. According to the *Law on Transport of Hazardous Materials* (Official Gazette of RS, no. 1/08, 117/ 11), waste is considered hazardous material if it has the characteristics of such material. Regulations on road, rail and inland waterway transport of hazardous waste have been adopted on the basis of this Law.

#### 2.2.5.4 Brčko District of BiH

Based on the review of the POPs Legislation Group, Brčko District has not yet adopted legislation that governs this area. As in the Federation of BiH, in Brčko District the Law on chemicals, as well as regulation that limits or prohibits the production, trade and use of certain chemicals, have not been adopted yet.

In Brčko District, the Law on Transport of Hazardous Materials (Official Gazette of SFRY, no. 27/90) and the Law on Putting into Circulation of Toxins (Official Gazette of SFRY, no. 13/91) regulating this matter in the same manner as in FBiH are in force.

In Brčko District, waste management (including hazardous waste) is regulated through:

- The *Law on Waste Management in RS* (Official Gazette of BD, no. 25/04, 19/07, 1/05, 2/08 i 9/09);
- The *Regulation on Waste Categories with Catalogue* (Official Gazette of BD, no. 32/06);
- *The Regulation on Treatment of Hazardous Waste Not on the Waste List or Whose Content is Unknown* (Official Gazette of BD, no. 32/06).

Brcko District has not yet passed the Regulation on Transboundary Movement of Waste.

Annex 5 provides detailed information on management of POPs according to the regulations at the level of BiH, FBiH, RS and BD, for each of the POPs chemicals from the Stockholm Convention list.

## 2.3 CURRENT POPs MANAGEMENT IN BOSNIA AND HERZEGOVINA

Evaluation of POPs management in BiH is based on a preliminary inventory of POPs chemicals developed by the POPs inventory groups established by the National Executive Agency (NEA) in cooperation with the Ministry of Foreign Trade and Economic Relations of BiH. As stated in *Chapter 1.2 Process of development of the National Implementation Plan in Bosnia and Herzegovina*, six working groups was responsible for developing a preliminary inventory of POPs in BiH:

- POPs Pesticides Inventory Group
- PCB Inventory Group
- PCDD/PCDF Inventory Group
- PBDEs/ PFOS Inventory Group
- Environment, Health, Research and Development Group
- POPs legislation and Socio-economic Development Group

The inventory groups had a task to determine, on the one hand, the current regulatory status of Management of POPs as chemicals and/or when their useful life is complete, as wastes, and on the other, to determine their production in BiH, import, export, transport, use, stocks of these chemicals, waste containing POPs and possibly locations in BiH contaminated with POPs.

### 2.3.1 PRELIMINARY INVENTORY OF POPs PESTICIDES- ANNEX A, PART I OF THE STOCKHOLM CONVENTION

#### 2.3.1.1 Introduction

According to the Directive EC 128/2009, pesticides include plant protection products as defined in Regulation (EC) No 1107/2009 and biocides as defined in Directive 98/8/EC of the European Parliament and of the Council of 16 February 1998.

In the mid-twentieth century, POPs pesticides were largely produced and used for crop protection, as a result of which, massive amounts have spread in the environment and due to their persistence, they represent a long-term threat to all environmental components, in all countries of the world. Pesticides are released into the environment as a result of direct application to agricultural land, and by leaking through the soil or dispersion of droplets, they can reach non-target areas, such as groundwater and surface water, as well as forests and other non-agricultural areas. Some POPs substances, except that were used for the formulation of plant protection products, were used for the preparation of biocide products.

Biocide products (biocides) are active substances or preparations, containing one or more active substances, prepared in the form in which they are supplied to customers, intended to destroy, deter, render harmless, prevent the action of or exert a controlling effect on any unwanted organism by chemical or biological means. Active substances are substances or micro-organisms, including viruses, which have general or special impacts on harmful organisms or plants, parts of plants or plant products. Undesirable and harmful organisms, which are controlled by biocides, are all organisms whose unwanted presence or a harmful effect affects people, their activities, products used, the products they produce, on animals or the environment<sup>54</sup>.

Pursuant to Regulation (EC) no. 1107/2009 of the European Parliament and the Council, plant protection products are products which are formulated in the form in which they are delivered to the user, and which consist of or contain active substances, protectants, or synergists, and are applied as follows:

- a. for protection of plants or plant products against harmful organisms or for prevention of harmful organisms, unless these products are used for hygiene purposes, and not for protection of plants and plant products;
- b. as substances that affect the life cycle of plants, such as substances that act on the growth, in addition to plant nutrition products;

<sup>54</sup> The Law on Biocides (Official Gazette of RS, no. 25/09)

- c. for preservation of plant products, especially substances or products which are not subject to special Community provisions on preservatives;
- d. for destruction of undesired plants or parts of plants, except algae, unless these products are applied to the soil or water to protect plants;
- e. for control or prevention of undesired plant growth, except algae, unless these products are applied to the soil or water to protect plants.

At the beginning of the development in phytopharmacy, pesticides, particularly insecticides, were organochlorine and organophosphorus compounds; these are the very insecticides that were subsequently given the status of POPs pesticides. An adequate substitute for POPs pesticides was not provided until the introduction of other insecticides, such as pyrethroids, neonicotinoids and carbamates.

### Overview of pesticides included in the list of POPs chemicals of the Stockholm Convention

#### Annex A (Elimination)

Annex A includes the chemicals for which the Parties to the Stockholm Convention are obliged to take actions to eliminate the production and use of. Special exceptions for use or production are listed in the Annex and are applicable only to Parties which have registered for such exception. 14 of the total number of chemicals that are targeted for elimination are pesticides. Pentachlorobenzene is still used as an industrial chemical (as a flame retardant and chemical intermediate), whereas hexachlorobenzene (HCB) can be formed as an unintended by-product during the manufacture of chemicals.

**Table 14:**  
Overview of Annex A  
POPs pesticides which  
are included in the  
list of the Stockholm  
Convention

Pesticide-generic name	Name according to the IUPAC nomenclature	Type of chemical	Type of pesticide	CAS <sup>55</sup>
Aldrin	1,2,3,4,10,10-Hexachloro-1,4,4a,5,8,8a-hexahydro-1,4:5,8-dimethanonaphthalene	P	IN	309-00-2
Dieldrin	(1aR,2R,2aS,3S,6R,6aR,7S,7aS)-3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-2,7:3,6-dimethanonaphtho[2,3-b]oxirene	P	IN	60-57-1
Alpha Hexachlorocyclohexane	$\alpha$ -1,2,3,4,5,6-hexachlorocyclohexane	P	IN	319-84-6
Beta Hexachlorocyclohexane	$\beta$ -1,2,3,4,5,6-hexachlorocyclohexane	P	IN	319-85-7
Mirex	1,1a,2,2,3,3a,4,5,5,5a,5b,6-dodecachlorooctahydro-1H-1,3,4-(methanetriyl)cyclobuta[cd]pentalene	P	IN	2385-85-5
Chlordane	1,2,4,5,6,7,8,8-Octachloro-2,3,3a,4,7,7a-hexahydro-4,7-methanoindene	P	IN	12789-03-6
Endrin	Mendrin, Compound 269 (1aR,2S,2aS,3S,6R,6aR,7R,7aS)-3,4,5,6,9,9-hexachloro-1a,2,2a,3,6,6a,7,7a-octahydro-2,7:3,6-dimethanonaphtho[2,3-b]oxirene	P	AV, IN	72-20-8
Pentachlorobenzene	1,2,3,4,5-Pentachlorobenzene	P, IC	-	608-93-5
Chlordecone	decachloropentacyclo[5.3.0.0 <sup>2,6</sup> .0 <sup>3,9</sup> .0 <sup>4,8</sup> ]decan-5-one	P	IN	143-50-0
Heptachlor	1,4,5,6,7,8,8-Heptachloro-3a,4,7,7a-tetrahydro-4,7-methano-1H-indene	P	IN	76-44-8
Hexachlorobenzene (HCB)	Hexachlorobenzene	P, IC	F	118-74-1
Lindane (gamma-HCH)	(1r,2R,3S,4r,5R,6S)-1,2,3,4,5,6-hexachlorocyclohexane	P	IN	58-89-9
Toxaphene	Toxaphene	P	AC, IN	8001-35-2
Technical endosulfan and its isomers	6,7,8,9,10,10-Hexachloro-1,5,5a,6,9,9a-hexahydro-6,9-methano-2,4,3-benzodioxathiepine-3-oxide	P	IN	115-29-7, 959-98-8, 33213-65-9

P= Pesticide; IC= Industrial chemical; AC = Acaricide; IN = Insecticide

<sup>55</sup> CAS Registry Number is a unique identification number of a chemical substance for the purpose of unambiguous classification and sorting of chemicals

### Annex B (Restriction)

Annex B includes the chemicals for which the Parties to the Stockholm Convention are obliged to take actions to restrict the production and use of, and contains only DDT as a pesticide.

Pesticide-trivial name	Name according to the IUPAC nomenclature	Type of chemical	Type of pesticide	CAS
DDT	1,1,1-trichloro-2,2-di(4-chlorophenyl)ethane	P	AC, IN	50-29-3

P= Pesticide; AC = Acaricide; IN = Insecticide

**Table 15:**  
Overview of Annex B POPs pesticides which are included in the list of the Stockholm Convention

#### 2.3.1.2 Process of developing the POPs pesticides preliminary inventory

The preliminary inventory of POPs pesticides was developed in accordance with "Guidance for developing a national implementation plan for the Stockholm Convention on POPs" (2012). The process of developing the inventory is described in detail in Annex 6.

#### 2.3.1.3 History of trade of POPs pesticides

During the period from 1950 to 1990, the use and trade of pesticides in Bosnia and Herzegovina took place under the legislative authority of the federal government, i.e. the Socialist Federal Republic of Yugoslavia (SFRY), and therefore the legal framework for the trade of all pesticides, including those which are today considered as POPs according to the Stockholm Convention, was the same in all the SFRY republics. Considering the time of application of these compounds in BiH, POPs pesticides can be classified into three groups:

- the ones that were never permitted for trade in BiH (mirex),
- the ones that were used and then prohibited 20 or more years ago (DDT, hexachlorobenzene, chlordane, heptachlor, aldrin, dieldrin, endrin, toxaphene),
- the ones that were applicable until recently (lindane and endosulfan).

Pesticide	Use	Period of trade and use	Year of ban
Aldrin	P	1957-1972	1976
Dieldrin	P	1957-1972	1972
Alpha hexachlorocyclohexane	P	From 1944	1972
Beta hexachlorocyclohexan	P	From 1944	1972
Mirex	P	Was not in trade	-
Chlordane	P	1955-1971	1971
Endrin	P	1957-1989	1989
Chlordecone	P	Was not in trade	-
Heptachlor	P	1956-1973	1973
Hexachlorobenzene (HCB)	P, IC	1962-1980	1980
Lindane	P	From 1944	1 Oct 2008
Toxaphene	P	1957-1982	1982
Technical endosulfan and its related isomers	P		1 Oct 2008
DDT*	P	1944-1989	1989*

\* The use of DDT in agriculture was stopped in the period 1971 - 1973, while its use in the sector of public health and forestry stopped in 1989

Source: National implementation plan for the implementation of the Stockholm Convention, the Ministry of Environment and Spatial Planning of the Republic of Serbia, 2010

**Table 16:**  
Period in which POPs pesticides were on the market in BiH

On 20 October 10, 1971, SFRY published a Decree ("Official Gazette of SFRY", no. 19/1972) on the basis of which several restrictions, regarding the application of pesticides, came into force. POPs pesticides or pesticides in general, were not produced on the territory of Bosnia and Herzegovina. In fact, on the basis of general knowledge of the pesticide industry in the SFRY, which is also specified in the Serbian National Implementation Plan for the Stockholm Convention, the POPs Pesticides Inventory Group has concluded that the production of pesticides in SFRY took place in Serbia, Croatia, Slovenia and Macedonia. Production of POPs pesticides began with the manufacturing of DDT in 1947 at "Zorka Zaštita bilja", Šabac, and in the early '50s at "Chromos"-Zagreb (Republic of Croatia). Registration of pesticides in SFRY was under the exclusive competence of the federal government and the state legislature, and therefore pesticides were not registered at the republic level, but only at the federal level. The

production of POPs pesticides in the last century should be viewed in the context of production of POPs pesticides in former Yugoslavia, which is where the following manufacturers were located, but their products were consumed on the territory of BiH as well:

- It is indicated in the Serbian National Implementation Plan for the Stockholm Convention, only DDT was synthesized in Serbia during the fifties and sixties of the last century (“Zorka-Zaštita bilja”, Šabac), but the production was halted in the early seventies. Other substances (aldrin, dieldrin, endrin, toxaphene, chlordane, heptachlor and hexachlorobenzene) were imported as technical products and used in the formulation of preparations in the factories “Zorka-Zaštita bilja”, Šabac, “Župa”, Kruševac and “Galenika-Fitofarmacija”, Zemun;
- “Pinus” from Maribor - aldrin, DDT, dieldrin, endrin;
- “Chromos” from Zagreb, - aldrin, DDT, dieldrin, endrin;
- “Ohis” from Skoplje - DDT, lindane, dieldrin, heptachlor.

Data on consumption and trade of pesticides in Bosnia and Herzegovina are not available as active substances, but rather as the statistical determinant of plant protection products. On the other hand, by looking at tariff codes, it is not possible to see the individual active substances (e.g. lindane, DDT), but only one whole group of chemical pesticides, e.g. insecticides based on chlorinated hydrocarbons under tariff code 3808 91 20 00. The term “POPs pesticides” is used because all chemical compounds that have acquired the status of POPs pesticides are in fact insecticides, i.e. they kill insects and thus reduce their population. Furthermore, pesticides were imported as formulated preparations, and were delivered to the user in this form, whereas, technical concentrates of the active substance were not imported since pesticides were not manufactured in Bosnia and Herzegovina. Hence, the POPs Pesticides Inventory Group was unable to find data indicating the amount of pesticides imported into Bosnia and Herzegovina or whether they rank as POPs pesticides today. Table 17 and Figure 9 present the trade of pesticides on the territory of the SFRY, in 1969 and 1970, when most of the POPs pesticides, except for lindane and endosulfan, were withdrawn and banned. The POPs Pesticides Inventory Group was unable to find data on the import of biocides into BiH, which are listed as POPs pesticides.

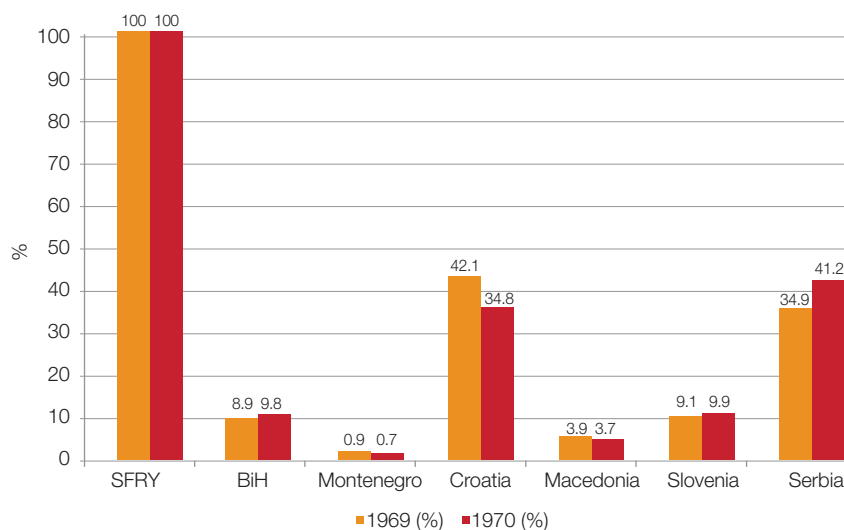
**Table 17:**  
Traffic\* of plant protection products in SFRY in 1969 and 1970 in tonnes

\*Traffic of pesticides was regulated by the Law on transport of pesticides in force at that period and the Law on production and trade of toxic substances, and in terms of these laws, the term traffic of toxins was considered export, storage, sale, use, issuance and sale of toxins otherwise

Traffic of pesticides (t)		
Area	1969	1970
SFRY	17,762	17,831
BiH	1,596	1,741
Montenegro	169	127
Croatia	7,481	6,207
Macedonia	689	652
Slovenia	1,616	1,764
Serbia	6,211	7,340

Source: Statistical Yearbook of Yugoslavia, 1971

**Figure 9:**  
Percentage share of pesticide trade in Bosnia and Herzegovina compared to trade of pesticides in former Yugoslavia in 1969 and 1970



Source: Statistical Yearbook of Yugoslavia, 1971

### 2.3.1.4 Current status of POPs pesticides management

Until 1990, the legislative framework related to pesticide trade in Bosnia and Herzegovina was in compliance with the legislative framework of the SFRY, and all the decisions made by the federal government, in relation to prohibitions and restrictions on trade of pesticides, including POPs, were valid for all the republics of the SFRY, including the then Socialist Republic of Bosnia and Herzegovina. Import and use of most POPs pesticides in BiH (DDT, hexachlorobenzene, chlordane, heptachlor, aldrin, dieldrin, endrin, toxaphene) were banned in the early seventies of the twentieth century by the Regulation published in the Official Journal of the SFRY (19/1972). During the inventory, POPs Pesticides Inventory Group found that this ban is still valid.

After the war, the Council of Ministers of BiH began to take measures for the harmonization of the legal framework of BiH with the EU regulations, including the laws and practices on the use of pesticides, as well as of POPs pesticides. By the *Decision on Prohibition of Registration, Import and Trade of Phytopharmaceutical Agents*, adopted by the Council of Ministers of BiH, pesticides containing active substances lindane and endosulfan were banned, with a deadline for sale and use by final consumers until 1 October 2008<sup>56</sup>. Previously, the production, trade, storage and use of active substances lindane and endosulfan were banned pursuant to the *Law on Toxins* (Official Gazette of the RS, no. 70/06 and 73/08).

provide the names of the preparations based on endosulfan and lindane, which had a trade permit in Bosnia and Herzegovina.

Active substance	Name of phytopharmaceutical agent	Manufacturer	Allowed until*
Endosulfan	TIOCID E 35	„ŽUPA“ Kruševac	1 October 2008
	THIODAN	„AVENTIS CROP SCIENCE“	
	TIHODAN E 35	“BAYER”	
	BEVETICID	“CHINA NATIONAL CH CONSTRUCTION JIANGSU COMPANI” China	
	ENDOFAN 35-EC	“Nufarm GmbH& Co KG” Austria and kooperant Delta M	
	TEODICID	“AGRO BN” Bijeljina**	
	TRIHONEX E -35	“Makhteshim Chemical Works” Ltd, Beer Sheva, Israel	
	THIOSULFAN 35 EC	“Rallis India Limited, India I kooperant Delta M	

\*Sale and use by final consumers allowed until

\*\* Only packages and labels already imported and formulated pesticides

*Table 18:*  
Extract from the *Decision on banning of registration, import and transport of phytopharmaceutical agents by the Council of Ministers of BiH (Official Gazette of BiH, No. 55/08) - Endosulfan*

Active substance	Name of phytopharmaceutical agent	Manufacturer	Allowed until*
Lindane	LINDAN E – 20	„ŽUPA“ Kruševac	1 October 2008
	LINDAN		
	LINDAN - 20	“ZORKA” Šabac	
	BEVEDAN 20 EC	AD “BV KOMERC” Novi Sad	
	DRVOLIN	“ZORKA” Šabac	
	DRVOLIN BN	“AGRO BN” Bijeljina**	
	GEOLIN G-15	“ZORKA” Šabac	
	GEOLIN G-3		
KSILOLIN	“GALENIKA” fitofarmacija Zemun		

\*Sale and use by final consumers allowed until

\*\* Only packages and labels already imported and formulated pesticides

*Table 19:*  
Extract from the *Decision on banning of registration, import and transport of phytopharmaceutical agents by the Council of Ministers of BiH (Official Gazette of BiH, No. 55/08) - Lindane*

Pesticides that fall under the group of POPs pesticides are not on the positive list (Annex I), as regulated in the EU by the Regulation (EC) No 1107/2009, and therefore it is not possible to get a license for import and use of these pesticides in BiH. In RS, pursuant to the *Regulation*

<sup>56</sup> In 2014 this decision was repealed by the Decision on Repealing of the Decision which Prohibits Registration, Import and Transport of Certain Active Substances (Official Gazette of BiH, no.22/14). With the entry into force of this decision, all active substances that are not on the List of Active Substances Permitted for Use Phytopharmaceutical Agents in Bosnia and Herzegovina, issued by the BiH Plant Health Protection Administration, are considered to be banned for use in phytopharmaceutical agents in BiH.

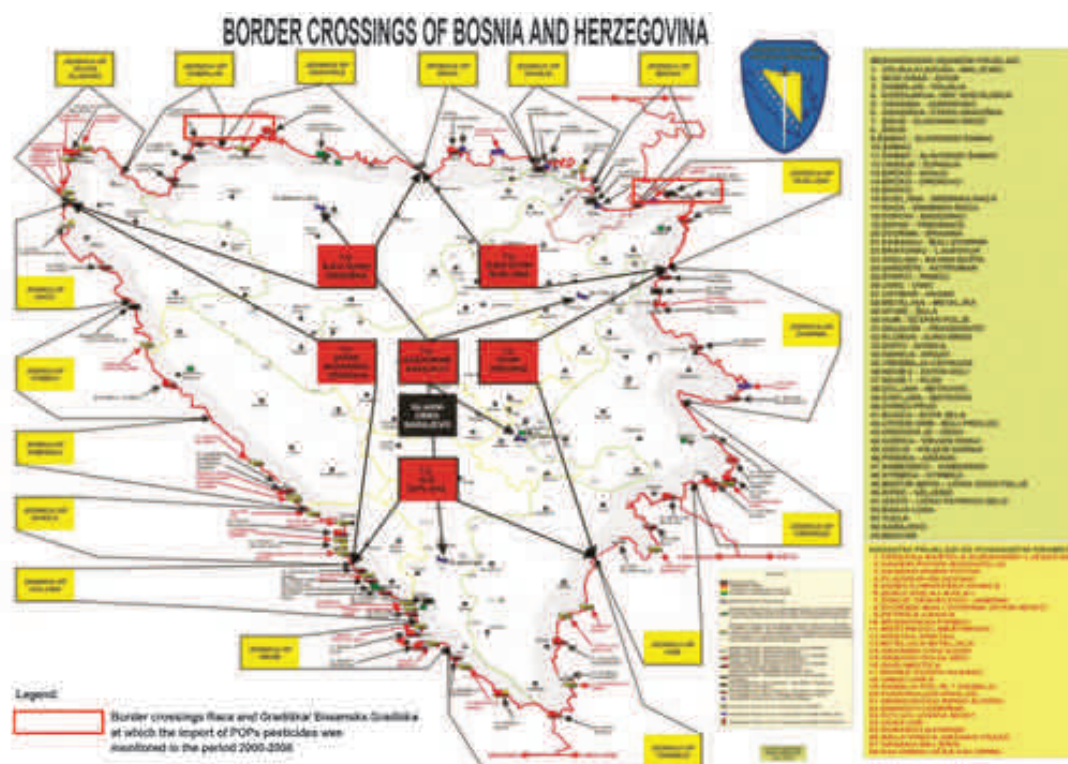
Amending the Regulation on Conditions for Restricting and Prohibiting the Manufacture, Trade and Use of Chemicals (Official Gazette of RS, no. 63/13), hexachlorocyclohexanes (HCH), including lindane, are listed under Annex 2, Part A: List of prohibited POPs substances from the Stockholm Convention, whereas placing on the market and using products containing endosulfan was allowed until December 31, 2013, only in as much as they were produced or used before this Regulation came into force. In FBiH and BD these regulations have not yet been enacted. According to regulations on biocides in Republika Srpska, lindane and endosulfan are not on the list of permitted substances in biocide products; therefore, biocide products containing such substances may not be marketed and used in Republika Srpska.

The use of DDT pesticides was discontinued in agriculture in the period from 1971 to 1973, whereas in public health and forestry it was used until 1989. Based on research the POPs Inventory Group concluded that DDT pesticides were not produced on the territory of BiH, nor were they imported, exported and used after 1989. Furthermore, the existence of stockpiles and wastes of DDT has not been confirmed within the framework of the preliminary inventory. Even though this pesticide was prohibited in the former SFRY, these prohibitions are confirmed by recent legislative acts. Thus, according to the *Regulation Amending the Regulation on Conditions for Restricting and Prohibiting the Manufacture, Trade and Use of Chemicals* (Official Gazette of RS, no. 63/13) DDT compound (1,1,1-trichloro-2,2-bis(4-chlorophenyl) ethane) is on the Annex 2, Part A List of prohibited POPs substances from the Stockholm Convention, i.e. DDT is not on the list of permitted substances in biocide products; therefore, biocide products containing DDT may not be marketed and used in Republika Srpska.

### 2.3.1.5 Import and export of POPs pesticides

Trade of pesticides in BiH consisted of import and application of pesticides. Specifically, compared to the total pesticide imports in Bosnia and Herzegovina, a very small amount was formulated into preparations and biocides (rodenticides and insecticides) are used for pest control and disinsection in public hygiene, among which there were no POPs pesticides. Rodenticides are formulated based on the active substance bromadiolone and insecticides based on the active substance imidacloprid, which do not rank as POPs pesticides. Having obtained no official data and knowing the trade chain of pesticides, the POPs Pesticides Inventory Group presumes that the territory of BiH was rarely used for transit of pesticides, except when, on occasion, transiting from Croatia to Montenegro through BiH. This presumption is based on the fact that the major manufacturers and distributors of pesticides had production facilities or offices in Croatia and Serbia, so it is unlikely that goods were first imported (transited) to Bosnia and Herzegovina, only to be imported to Serbia and Croatia afterwards.

*Figure 10:*  
Percentage share of Map  
of border crossings of  
Bosnia and Herzegovina,  
with the border crossings  
Gradiška and Rača  
marked





Trade of pesticides in BiH was not uniformly monitored by the state and entity authorities and data on import are not publicly published. The POPs Pesticides Inventory Group managed to find information on the import of pesticides only for the period from 2000 to 2008, the analysis covering only two border crossings: Gradiška (between Bosnia and Herzegovina and Croatia) and Rača (between Bosnia and Herzegovina and Serbia), given that the largest amount of pesticides was being imported to BiH through these crossings, regardless of their country of origin.

Due to the fact that during this period, i.e. the period in which POPs pesticides were being imported, there was no organized and unified monitoring of pesticide imports, and during the period of developing the inventory (June-November 2013), the POPs Pesticides Inventory Group was unable to obtain data on pesticide trade from the Indirect Taxation Authority of BiH, the data on the monitoring of the pesticide imports through the border crossings Rača and Gradiška were obtained by the Faculty of Agriculture in Banja Luka.

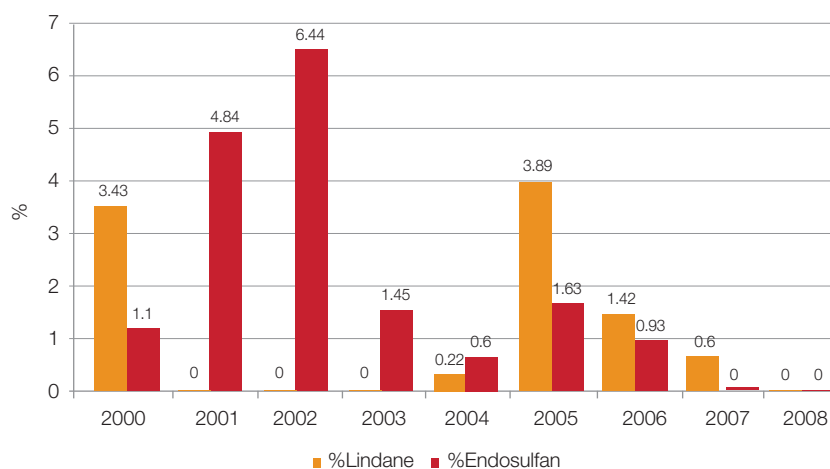
During the period from 2000 to 2008, ending in 2007, lindane and endosulfan were imported in quantities shown in Table 20. As of 2008, lindane and endosulfan were no longer imported.

Active substance	Review of the amount of imported products by year (l or kg*)								
	2000	2001	2002	2003	2004	2005	2006	2007	2008
INSEKTICIDI (Σ)	218,354	75,856	108,678	172,440	455,615	86,071	106,077	233,450	124,481
ENDOSULFAN**	7,500	0	0	0	1,008	3350	1,504	1,400	0
LINDANE**	2,400	3,675	7,000	2,500	2,713	1,400	990	0	0

\* Since the pesticidal compositions are imported, sold and used in the form of solid and liquid formulations, they were not analyzed specifically based on their formulation, but on total import, and are therefore referred to using both units (l or kg)

\*\* The preparations of endosulfan and lindane were formulated as concentrated emulsions (EC), and therefore the imported quantities of these insecticides are expressed in litres

**Table 20:**  
Overview of endosulfan and lindane import in BiH for the period 2000 – 2008 at border crossings Gradiška and Rača



**Figure 11:**  
Percentage share of POPs pesticides (endosulfan and lindane) in the total amount of imported insecticides, in the period 2000-2008, at border crossings Rača and Gradiška

Source: Literature 1-13 - Annex 7

The percentage share of imported preparations based on lindane in the total amount of insecticides per year, in the period from 2000 to 2008, ranged from 0 to 3.89%, while the participation of preparations based on endosulfan was 0 to 6.44%, depending on the year.

In addition to the research data obtained from the Faculty of Agriculture in Banja Luka, for the period 2000-2008, during the process of developing the POPs pesticides inventory, the POPs pesticides inventory group has also received information from the Statistical Agency of Bosnia and Herzegovina (for the period 2008-2013), as well as from the Customs Sector of the Indirect Taxation Authority (for 2012 and the first 9 months of 2013). The aforementioned institutions have submitted data on import and export of goods under relevant tariff codes. In BiH, tariff codes, which are used for indicating compounds classified as POPs pesticides, can have two sets of labels, i.e. they go by the tariff code 2903, i.e. as halogenated derivatives of hydrocarbons - saturated chlorinated derivatives of acyclic hydrocarbons, as well as by the tariff code 380891, as insecticides, specifically 3808912000 insecticides - based on chlorinated hydrocarbons, as shown in Table 21.

**Table 21:**  
Overview of tariff codes  
in BiH for goods which  
might include POPs  
pesticides

Tariff code	Name
2903 82 00 00	Aldrin, Heptachlor, Chlordane
2903 92 00 00	Hexachlorobenzene, DDT
2910 40 00 00	Dieldrin
2913 90 00 00	Endrin
2903 89 90 00	Mirex
3808	Insecticides, rodenticides, fungicides, herbicides, anti-sprouting agent for plant-growth regulators, disinfectants and similar products, prepared in forms or packaging for retail sale or as supplements or products (e.g. sulphurised tapes, wicks, candles and paper for killing flies)
3808 50 00 00	Toxaphene
3808 91	insecticides:
3808 91 10 00	Insecticides - based on pyrethroids
3808 91 20 00	Insecticides - based chlorinated hydrocarbons
3808 91 30 00	Insecticides – carbamate based
3808 91 40 00	Insecticides - based organophosphorus compounds
3808 91 90 00	Insecticides - other

According to the information provided by the Customs Sector of the Indirect Taxation Authority, the POPs pesticides inventory group concluded that, during 2012 and the first nine months of 2013, there were no imports of compounds under tariff codes:

- **2903820000**- aldrin, heptachlor, chlordane;
- **2903 920000**- hexachlorobenzene, DDT;
- **2910400000**- dieldrin;
- **2913900000**- endrin;
- **2903899000**-mirex.

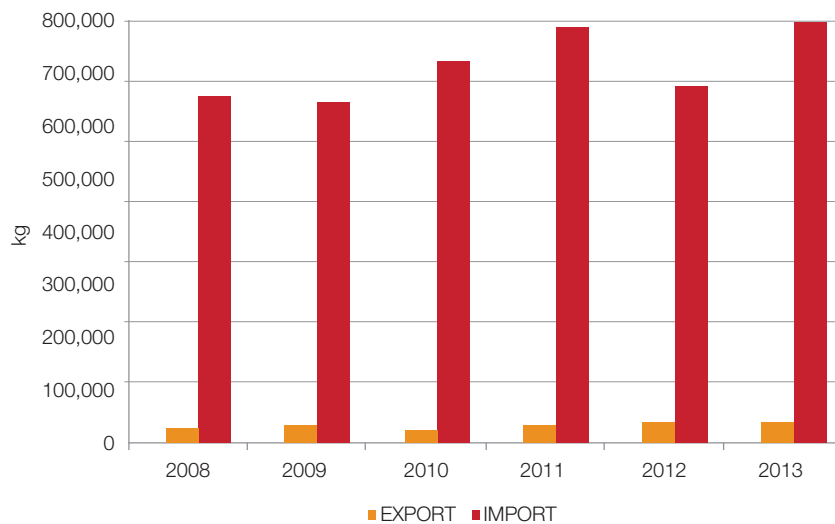
It is stated in the memo, there were imports of goods under tariff codes: 3808500000 which include other products in the group, under tariff code 3808, consisting of insecticides, rodenticides, fungicides, herbicides, anti-sprouting agents, plant growth regulators, disinfectants and similar products, prepared in forms or packings for retail sale or as supplements or products (e.g. sulphurised strips, wicks, candles and fly paper for killing flies). After a more detailed analysis of the product under tariff code 3808500000, the POPs Pesticides Inventory Group has concluded that it is a disinfectant which does not fall within POPs pesticides.

By analysing data provided by the Statistical Agency of Bosnia and Herzegovina, the POPs Pesticides Inventory Group has concluded that insecticide imports, from 2008 to October 1, 2013, ranged between 554.527,4 - 688.698,93 kg, as shown in Table 22.

**Table 22:**  
Overview of trade  
exchange of BiH (imports  
and exports) of goods  
under the tariff code  
380891 (insecticide) for  
the period 2008 - 2013

Year	Export (kg)	Import (kg)
2008	13,350.5	566,741.28
2009	20,236.08	554,527.4
2010	11,248.45	625,686.75
2011	21,501.09	681,025.87
2012	27,064.32	582,753.27
2013	26,003.78	688,698.93

Source: Agency of Statistics of BiH



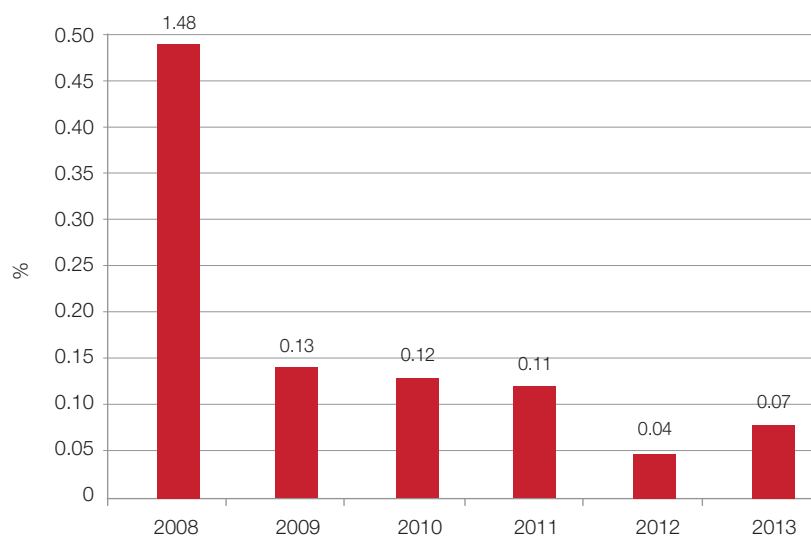
**Figure 12:**  
Graphical representation of trade exchange in Bosnia and Herzegovina (imports and exports) of goods under the tariff code 380891 (insecticides) for the period 2008 - 2013

The data provided by the Agency for Statistics of BiH, also shows that in the period from 2008 to 2012, a certain amount of goods was imported under the tariff code 3808912000, which indicates that they were insecticides based on chlorinated hydrocarbons. Since POPs pesticides are mainly insecticides formulated on chlorinated hydrocarbons, and given that the Statistical Agency of Bosnia and Herzegovina did not have a detailed list of products under the tariff code 3808912000, the POPs Pesticides Inventory Group has concluded that there is a possibility that there were POPs pesticides among them as well. Table 23 presents the total amount of these imported products. Participation of the goods imported under tariff code 3808912000, in the total share of insecticides, amounted to 0.07-0.48%, or in terms of absolute value 240-2,705.87 kg.

Year	Export (kg)	Import (kg)
2008	0	2,705.87
2009	0	727.8
2010	0	761.0
2011	0	769.6
2012	0	240.6
2013	0	517.2

**Table 23:**  
Overview of trade exchange of BiH (imports and exports) of goods under the tariff code 3808912000 (insecticides based on chlorinated hydrocarbons) for the period 2008 - 2013

Source: Agency of Statistics of BiH



**Figure 13:**  
Percentage share of goods under tariff code 3808912000 (insecticides based on chlorinated hydrocarbons) in the total amount of imports of insecticides, i.e. goods under tariff code 380891

On the basis of the data submitted by the Agency for Statistics of BiH, the POPs Pesticides Inventory Group could not establish with certainty, which products were imported under tariff code 3808912000, i.e. whether there were POPs pesticides among them.

The POPs Pesticides Inventory Group was unable to find data on the import of biocides into BiH, which are listed as POPs pesticides.

### 2.3.1.6 Import of pesticides

In the period from 2000 to 2008, pesticides were being imported through border crossings Rača and Gradiška, in quantities of 537,646 to 1,338,570.5 kg (l), as shown in Table 24, Table 25 and Figure 14.

**Table 24:**  
Circulation of pesticides at border crossings Rača and Gradiška for the period 2000 - 2008

YEAR	QUANTITY OF COMPOUND*	IMPORT VALUE
	kg (l)	€
2000	802,579.7	7,230,706.2
2001	537,646.0	3,868,195.9
2002	669,577.0	4,145,919.0
2003	1,103,662.6	5,203,646.2
2004	1,338,570.5	5,683,131.3
2005	669,989.6	4,830,752.9
2006	725,632.6	3,867,078.4
2007	845,882.9	4,912,424.4
2008.	575,180.7	4,370,415.0

\*NOTE: Since the pesticidal compositions are imported, sold and used in the form of solid and liquid formulations, they were not analyzed specifically based on their formulation, but on total import, and are therefore referred to using both units (l or kg)

Source: Literature 1-13 - Annex 7

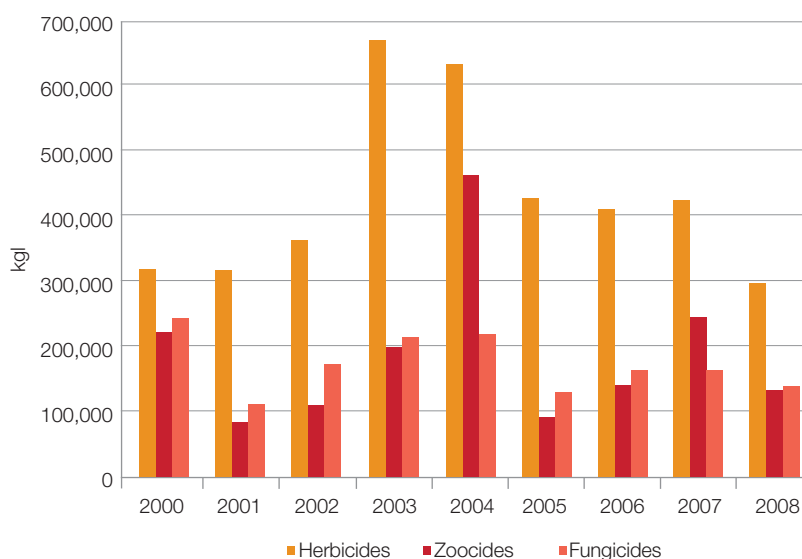
**Table 25:**  
Quantity of pesticides imported into BiH at the border crossings Rača and Gradiška in the period 2000-2008

YEAR	Quantity of compound* (l or kg**)		
	Herbicides	Zoocides	Fungicides
2000	324,469	223,074	246,624
2001	320,540	83,061	111,416
2002	369,000	108,678	172,599
2003	684,090	198,603	217,595
2004	646,682	471,199	221,089
2005	436,926	91,389	132,794
2006	417,793	141,866	165,972
2007	432,597	248,865	164,420
2008	301,143	132,262	141,775

\* In addition to herbicides, zoocides and fungicides pesticides from the group „others“ were also imported, which included auxiliary substances or growth regulators, whose quantity was small

\*\* Since the pesticidal compositions are imported, sold and used in the form of solid and liquid formulations, they were not analyzed specifically based on their formulation, but on total import, and are therefore referred to using both units (l or kg)

Source: Literature 1-13 - Annex 7



*Figure 14:*  
Quantity of pesticides imported to Bosnia and Herzegovina through the border crossings Rača and Gradiška, in the period 2000-2008 – graphical representation

### 2.3.1.7 Existing stockpiles, wastes containing POPs pesticides, disposal sites and sites contaminated with POPs pesticides

Based on the above available and analyzed data, the POPs Pesticides Inventory Group has determined that no pesticides were produced in BiH, nor was there any factory for formulating preparations using technical concentrate of active substances belonging to pesticides. Based on the responses of the companies related to possession of stocks of pesticides and the fact that these pesticides were banned and could not be imported as of 2008, the POPs Pesticides Inventory Group has concluded that there are no POPs pesticides stockpiles in BiH. However, the situation in BiH, regarding the existing stockpiles, wastes containing POPs and disposal sites of POPs pesticides, is significantly different than it is in the other former SFRY republics where pesticides were manufactured. Packaging disposal of POPs pesticides was dealt with in an uncontrolled and disorganized manner, because in BiH there was no organized way of disposing of packaging and packaging waste. By-laws regulating packaging and packaging waste management were adopted in 2011, in the Federation of Bosnia and Herzegovina and Republika Srpska (*Regulation on Packaging and Packaging Waste Management* (Official Gazette of FBiH, no: 88/11, 28/13) and *Decree on Packaging and Packaging Waste Management* (Official Gazette of RS, no: 50/11)). According to the data collected by the POPs Pesticides Inventory Group, packaging and packaging waste management system in FBiH and RS (which includes packaging that contains residues of hazardous substances and/or contaminated by hazardous substances) is in its establishment phase.

Based on the data collected, POPs Pesticides Inventory Group, has concluded that in BiH:

- there are no POPs pesticides stockpiles;
- there are no data on locations where packaging containing POPs pesticides was disposed of, and this primarily relates to lindane and endosulfan which were used until 2008.

In the survey conducted by the POPs Pesticides Inventory Group among the subjects authorized for sale, distribution and application of pesticides, wholesale and retail, both in agriculture and forestry, as well as in communal hygiene (DDD activities), the interviewed subjects have stated, in writing and subsequently during the telephone conversations, that they do not have stocks of POPs pesticides. The Republic Administration for Inspection Affairs of RS has stated, in writing, that in the period 2010 – 2013, the republic inspectors did not find any products or records thereof in meeting minutes, in the trade of plant protection products, without supporting documentation relating to import, without labels on the packaging or licenses for registration of pesticides. In the same letter, it was confirmed that two subjects in fact possessed substances which were prohibited by the Decision of the Council of Ministers of BiH, and Table 26 presents the discovered substances and their quantity.

**Table 26:**  
List of substances found  
in the warehouses of  
distributors in RS and  
whose trade is prohibited  
by the Decision of the  
Council of Ministers

Substance	Active substance	Quantity
Beskor 77	EPTC	2 l
Prometrin SC	Prometrine	11 l
Devrinol 45 FL	Napropamide	2.44 l
Diazinon 20	Diazinon	14.83 l
Gesagard 500 FV	Prometrine	2 l
Ronilan DF	Vinkozolin	0,7 l
Oleodiazinon	Mineral oil + Diazinon	4,5 l
Lannate 90	Methomyl	17.6 kg
Lannate 25	Methomyl	44 kg
Bemilex	Procymidon	23 kg
Notimil MZ	Metalaxyl + Mancozeb	42 kg
Alahlor 480	Alachlor	2 l
Ridomil*	Metalaxyl M + Copper Hydroxide or Metalaxyl M + Mancozeb	4 kg
Gramoxone	Paraquat Dichloride	74 l
Phostoksin	Aluminium Phosphide	2 kg
Cimogal	Monocrotophos + Cypermethrin	225 l

\*NOTE: The letter does not specify the precise name (only Ridomil) so we cannot be certain which combination of active matters are in question

Based on the data obtained from the Republic Administration for Inspection Affairs of RS, the POPs Pesticides Inventory Group has determined that there were no substances that fall within POPs pesticides among the preparations found in the warehouses of distributors in Republika Srpska. In addition, the Republic Administration for Inspection Affairs of RS organized, during the year 2009, through its agricultural inspection, a campaign in Republika Srpska, with the aim to ban trade and destruction of plant protection products which were prohibited for trade by the Decision of the Council of Ministers of BiH. For the listed substances that were found in trade, decisions were issued, ordering hazardous waste disposal measures in one of the 3 companies that were authorised for hazardous waste management at the time ("Kemis" d.o.o. Lukavac, "Kemis SPS" d.o.o. Doboje and "Sud.Mull" d.o.o. Tuzla).

Based on the letter sent by the Inspectorate of Brčko District in Bosnia and Herzegovina, the POPs Pesticides Inventory Group has concluded that, during the conducted inspection of internal trade within Brčko District in BiH, the agricultural inspection did not find any plant protection products without adequate documentation or products which were banned for sale in BiH. Furthermore, the Inspectorate claims that there were no consignments of protection products without documentation at the border crossings in Brčko District in BiH. There are no records of a location being contaminated with chemicals.

By analysis of the data provided by the Indirect Taxation Authority of BiH - Customs Sector Group, the POPs Pesticides Inventory Group has concluded that during 2012 and first nine months of 2013, there were no imports of compounds under tariff codes: 2903820000 - aldrin, heptachlor, chlordane; 2903 920000 - hexachlorobenzene, DDT; 2910400000 - dieldrin; 2913900000 - endrin; 2903899000-mirex. A detailed analysis of products imported under tariff code 3808500000 which includes other products in the group under tariff code 3808 which include insecticides, rodenticides, fungicides, herbicides, anti-sprouting agents, plant-growth regulators, disinfectants and similar products, the POPs Pesticides Inventory Group has concluded that these disinfectants do not belong under POPs pesticides

During the developing of the inventory, the POPs Pesticides Inventory Group has not received any response from the Federal Administration for Inspection Affairs.

During the preliminary inventory, the POPs Pesticides Inventory Group has received information from the Federal Institute of Agropedology that the Institute in the period 2008-2011 performed monitoring of 15 polycyclic aromatic hydrocarbons (PAHs) in the soil, at 260 locations. For other substances listed in Annexes to the Stockholm Convention, including POPs pesticides, data were not obtained. Also, the POPs Pesticides Inventory Group did not succeed to obtain data from the Agricultural Institute of RS related to the monitoring of POPs pesticides in the soil. Data on the monitoring of POPs in the environment and

food are presented in Chapters 2.3.9 *Existing programs for monitoring emissions and the impact on the environment and health* and 2.3.14 *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*.

In order to undertake a detailed analysis of POPs pesticide residues in the soil, the institutions responsible for monitoring soil quality should sample and analyze soil residues for POPs pesticides in accredited laboratories. Some critical points that the POPs Pesticides Inventory Group might suggest, and that are listed in the table below were selected by the intensity of agricultural production (at these locations in the past, and even now very intensive agricultural production has been or is performed). Given that these were large production facilities that were active forty years ago, the POPs Pesticides Inventory Group raises the possibility that in these areas some of POPs pesticides were used.

Location	Municipality	Former or present company	Grown cultures
Nova Topola	Gradiška	AIPK „Mladen Stojanović“	arable land
Trebovljani	Gradiška	Plantaže Gradiška	orchard
Šamac	Šamac	PIK „Šamac“	arable land
Banja Luka- Trapisti	Banja Luka	Ekonomija Poljoprivrednog instituta Banja Luka	arable land
Sarajevo- Butmir	Sarajevo	Agricultural Institute Butmir- Sarajevo	-
Mostar	Mostar	„HEPOK“ Mostar	grape vine
Gradačac or Orašje	Gradačac or Orašje	Organized labour unit - for the purchase and processing of tobacco, “Bosanac” in Orašje	tobacco

**Table 27:**  
*Potential locations contaminated with POPs pesticides*

### 2.3.1.8 Existing legal framework in the field of POPs pesticides

Management of POPs chemicals in BiH, including POPs pesticides, import/export, transportation and use of chemicals, prohibitions and restrictions with regard to the production, distribution and use of POPs chemicals, disposal and transportation of hazardous waste is described in *Chapter 2.2.5 Management of POPs Chemicals*.

#### Legally permissible concentrations of pesticides in the environment, food and working environment in BiH

##### *Environment*

In the Federation of BiH, the *Decree on Hazardous and Noxious Substances in Water* (Official Gazette of FBiH, no. 72/09) prescribes the maximum allowed concentrations of substances per individual classes of water, considered to be hazardous and noxious in accordance with Article 121, Paragraphs 2 and 3 of the *Law on Water* (Official Gazette of FBiH, no.70/06).

Hazardous substance	I - II class of surface waters $\mu$ g/l	III - IV class of surface waters $\mu$ g/l
Endosulfan	0.03	0.03
Endrin	0.001	0.005
Drina (Total)	0.03	0.03
DDT (Total)	0.005	0.050
Heptachlor	0.001	0.001
Chlordane	0.01	0.01
Toxaphene	0.005	0.05
Other organochlorine pesticides	0.001	0.01
Hexachlorobenzene	0.01	0.03
Lindane	0.02	0.20

**Table 28:**  
*Maximum permissible concentrations of POPs pesticides in surface waters in FBiH*

*Decision on Characterization of Surface and Ground Water, Reference Conditions and Parameters for Assessing the Status of Water and on Water Monitoring* (Official Gazette of FBiH, no 1/14) transposes a part of EU Directive (2008/105/EC) on environmental quality standards related to environmental quality standards (EQS) for surface waters for certain POPs pesticides. Mentioned pollutants have already been included in the regular water monitoring.

**Table 29:**  
Environmental quality standards for POPs pesticides in FBiH according to Decision on Characterization of Surface and Ground Water, Reference Conditions and Parameters for Assessing the Status of Water and on Water Monitoring

Substance	CAS	AA-EQS* Inland surface waters	AA-EQS* Other surface waters	MAC-EQS** Inland surface waters	MAC-EQS** Other surface waters
Aldrin	309-00-2	Σ=0.01	Σ=0.005	Not applied	Not applied
Dieldrin	60-57-1				
Endrin	72-20-8				
Total DDT***	Not applied se	0.025	0.025	Not applied	Not applied
Endosulfan	115-29-7	0.005	0.0005	0.01	0.004
Hexachlorocyclohexane	608-73-1	0.02	0.002	0.04	0.02

\* AA-EQS - Environmental quality standard for annual average concentration of parameters. Unless otherwise specified, it applies to the total concentration of all isomers.

\*\* MAC-EQS - Environmental quality standard for the maximum permissible concentration of parameters. Where the MAC-EQS is marked "not applicable", the value of AA-EQS is considered as protection from the extreme short-term pollution within continuous discharges since they are significantly lower than the values obtained on the basis of acute toxicity.

\*\*\* Total DDT consists of sum of isomers: 1,1,1-trichloro-2,2 bis (p-chlorophenyl) ethane (CAS No. 50-29-3; EU number 200-024-3); 1,1,1-trichloro-2 (o-chlorophenyl) -2- (p-chlorophenyl) ethane (CAS number 789-02-6; EU number 212-332-5); 1,1-dichloro-2,2 bis (p-hlorophenyl) ethylene (CAS No 72-55-9; EU number 200-784-6); and 1,1-dichloro-2,2 bis (p-chlorophenyl) ethane (CAS No. 72-54-8; EU number 200-783-0).

The Decree on Conditions for Discharging Wastewaters into Natural Recipients and Public Sewerage System (Official Gazette of FBiH, no 4/12) defines emission limit values of the substances and quality parameters for industrial wastewaters.

**Table 30:**  
Emission limit values of POPs pesticides for industrial wastewater in FBiH

Parameter	Unit	Emission limit values of industrial wastewater discharged into	
		Surface water bodies	Public sewage system
Hexachlorobenzene (HCB)	mg/l	0.03	0.03
Total organochlorine pesticides	mg/l	0.025	0.025

In Republika Srpska, the Decree on Water Classification and Categorization of Watercourses (Official Gazette of RS, no. 42/01) prescribes, for individual elements of chemical and sanitary-microbiological status, the numerical limit values based on corresponding numerical values defined in international and/or national standards of European countries and the hydrochemical characteristics of surface waters in RS.

**Table 31:**  
Permissible limits of POPs pesticides for certain classes of water in RS

Parameter	Unit	Quality class of surface waters	
		1.	2.-5.
DDT	mg/m <sup>3</sup>	Concentrations are below the limit of detection using best analytical techniques tehnikama	0.010
Aldrin	mg/m <sup>3</sup>		0.010
Dieldrin	mg/m <sup>3</sup>		0.010
Endrin	mg/m <sup>3</sup>		0.005
Hexachlorobenzene	mg/m <sup>3</sup>		0.030
Hexachlorocyclohexane	mg/m <sup>3</sup>		50

Limit values for POPs pesticides in industrial wastewater that can be discharged into surface waters or public sewage are regulated by the Regulation on Conditions for Discharging Wastewater into Surface Waters (Official Gazette of RS, no. 44/01) and the Regulation on Conditions for Discharging Wastewater into the Public Sewerage System (Official Gazette of RS, no. 44/01).

**Table 32:**  
Permissible limits of POPs pesticides in industrial wastewater that can be discharged into surface waters or public sewage

Parameter	Unit	Permissible limit value
DDT	mg/m <sup>3</sup>	400
Aldrin	mg/m <sup>3</sup>	10
Dieldrin	mg/m <sup>3</sup>	10
Endrin	mg/m <sup>3</sup>	10
Hexachlorobenzene	mg/m <sup>3</sup>	2,000
Hexachlorocyclohexane	mg/m <sup>3</sup>	4,000



In the Federation of BiH, the *Regulation on Determining Permissible Amounts of Harmful and Hazardous Substances in Soil and their Method of Testing* (Official Gazette of FBiH, no. 72/09) determines the substances that are considered pollutants of agricultural land and their allowed limit values in soil, sludge<sup>57</sup> and all municipal wastewater products, as well as the measures for preventing soil pollution, methods for determining the allowed amounts of harmful and hazardous substances, and the monitoring, prevention, protection and remediation of polluted soil. According to the Regulation, harmful substances are substances found in agricultural soil in concentrations which temporarily or permanently compromise its fundamental role of a favourable habitat for plants.

Organic harmful and hazardous substances	Limit values
DDT	0.1 mg/kg
Drina (total concentration = aldrins + dieldrins + endrins)	0.1 mg/kg
HCH compounds	0.1 mg/kg

**Table 33:**  
Limit values (maximum allowed amounts) of POPs pesticides in soil (expressed in mg / kg dry soil)

Organic harmful and hazardous substances	Limit values
HCH (total excluding lindane), Heptachlor, endrin, aldrin and dieldrin	0.05 mg/kg
Lindane	0.1 mg/kg
Sum of isomers of DDT + DDD + DDE	0.5 mg/kg

**Table 34:**  
Limit values (maximum allowed amount) of POPs pesticides in sludge and all products of municipal wastewater

In Republika Srpska and Brčko District, there are currently no regulations defining the maximum allowed concentrations of hazardous and harmful substances in soil.

#### *Food and potable water*

The *Regulation on Maximum Residue Levels of Pesticides in or on Food and Feed of Plant and Animal Origin of BiH*, in Annex II, defines the maximum residue levels of pesticides (MRL) for pesticide residues and the maximum residue levels (mg/kg) per groups and specimens of individual products. The Regulation refers to products of plant and animal origin or their parts (listed in Annex I), whether used as fresh, processed and/or an integral part of food and animal feed on or in which pesticide residues may be present. The following POPs pesticides are on the list of pesticides for which MRLs have been determined:

- Aldrin and dieldrin
- Chlordane
- DDT
- Endrin
- Endosulfan
- Heptachlor
- Alpha Hexachlorocyclohexane
- Beta Hexachlorocyclohexane
- Lindane

The *Regulation on the Sanitary Safety of Drinking Water* (Official Gazette of BiH, no. 40/10, 43/10, 30/12) defines the maximum allowable values of sanitary safety parameters for drinking water. Pesticides are among the substances regulated by this Regulation (Annex I, Part B, Chemical parameters).

<sup>57</sup> According to the Regulation, "sludge" means: a) residual sludge from household or city wastewater treatment plants and other plants for treatment of wastewater whose composition is similar to household or city wastewater; b) residual sludge from septic tanks and similar wastewater treatment facilities; and c) residual sludge from wastewater treatment plants.

**Table 35:**  
Maximum allowable  
pesticide values in  
drinking water

Parameter	Parameter value	Unit	Note
Pesticides	0.10	mg/l	<p>“Pesticide” means:</p> <ul style="list-style-type: none"> <li>▪ organic insecticides</li> <li>▪ organic herbicides</li> <li>▪ organic fungicides</li> <li>▪ organic nematocides</li> <li>▪ organic acaricides</li> <li>▪ organic algicides</li> <li>▪ organic rodenticides</li> <li>▪ organic slimicides</li> <li>▪ related products (inter alia, growth regulators) and relevant metabolites, degradation and reaction products.</li> </ul> <p>Only those pesticides which are likely to be present in a given supply system are monitored<sup>58</sup>.</p> <p>The parameter value is applied to each particular pesticide. When it comes to aldrin, dieldrin, heptachlor and heptachlor-epoxide, the parameter value is 0.030 µmg/l.</p>
Pesticides - total	0.50	mg/l	“Pesticides total” means the sum of all individual pesticides found and quantified in the monitoring procedure.

In Republika Srpska, the *Regulation on Hygienic Quality of Drinking Water* (Official Gazette of RS, no. 40/03) prescribes the following allowed concentrations of pesticides in drinking water:

**Table 36:**  
Maximum allowable  
concentrations of  
pesticides in drinking  
water (mg /) in RS

Substance	Regular occurrence
Pesticides total	0.5
Aldrin/dieldrin	0.03
DDT	0.1
Hexachlorobenzene	0.01
Heptachlor and heptachlorepoide	0.03
Lindane	0.2

#### Work Environment

The *Standard for Maximum Permissible Concentrations of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces* (SFRY, 1991) determines the maximum permissible concentrations (MPC) at worksites<sup>59</sup>, and the list of regulated substances includes the following POPs substances:

**Table 37:**  
Maximum permissible  
concentrations (MPC) at  
worksites

Name of substance	Maximum permissible concentration		
	mol/m <sup>3</sup>	mg/m <sup>3</sup>	cm <sup>3</sup> /m <sup>3</sup>
Aldrin	6.81 x 10 <sup>-7</sup>	0.25	0.15
DDT	1.41 x 10 <sup>-6</sup>	0.5	-
Dieldrin	6.56 x 10 <sup>-7</sup>	0.15	-
Endosulfan	2.45 x 10 <sup>-7</sup>	0.1	-
Endrin	2.62 x 10 <sup>-7</sup>	0.1	-
Hexachlorocyclohexane	2.28 x 10 <sup>-7</sup>	0.05	0.1
Heptachlor	1.34 x 10 <sup>-6</sup>	0.5	-
Chlorobiphenyl (42% Chlorine)	-	1	0.1
Chlorobiphenyl (54% Chlorine)	-	0.5	0.05
Chlordane	1.76 x 10 <sup>-6</sup>	0.5	-
Lindane	1.71 x 10 <sup>-6</sup>	0.5	-
Hexachlorobenzene	3.16 x 10 <sup>-6</sup>	0.9	-
Pentachlorobenzene	1.90 x 10 <sup>-6</sup>	0.5	-

Furthermore, the above mentioned Standard stipulates that if two or more gases, vapours, mists, fumes or dust are found at the same time in the atmosphere of worksites, the opinion of the competent institutions<sup>60</sup> must be obtained with regards to the assessment of the health risks to employees and the need to carry out protective occupational measures.

<sup>58</sup> According to Article 7 of the Regulation, monitoring of the sanitary safety of water intended for public water supply is carried out by competent inspectorates in the entities and BD, through the public health institutes in the entities and BD. The Standard determines the MPCs at certain worksites that do not require the application of sanitary and technical measures or the application of appropriate protection means.

<sup>59</sup> The Standard determines the MPCs at certain worksites that do not require the application of sanitary and technical measures or the application of appropriate protection means.

<sup>60</sup> The competent authorities for occupational health and protection are the Ministry of Labour and Social Policy in FBiH, the Ministry of Labour and Protection of War Veterans and Disabled Persons in RS and the Education Department in BD.

## Management of waste containing pesticides

In BiH waste management (including hazardous waste) is regulated by the entity laws and by-laws in the area of waste management, as well as relevant international conventions, as described in *Chapter 2.2.5 Management of POPs chemicals*.

According to the *Regulation on Waste Categories with Lists* (Official Gazette of FBiH, no. 9/05), *Regulation on Waste Categories with Catalogue* (Official Gazette of RS, no. 39/05) and the *Regulation on Waste Categories with Lists* (Official Gazette of BD, no. 32/06), waste containing or that may contain pesticides is listed under the following key numbers:

- 20 01 19\* - pesticides (under "municipal waste - household waste and similar commercial, industrial and institutional wastes from institutions")
- 02 01 08\* - waste from chemicals used in agriculture, containing hazardous materials

Annex 5 provides a parallel overview of management of POPs pesticides according to regulations on the level of BiH, FBiH, RS and BD, for each of the POPs pesticides listed in the Stockholm Convention.

### 2.3.1.9 Conclusions

Based on the preliminary inventory of POPs pesticides carried out between June and November 2013 the POPs Pesticides Inventory Group has concluded the following:

- POPs pesticides have not been produced in BiH;
- Import and use of most POPs pesticides in plant protection products in BiH has been banned since the early seventies of the last century, at the same time as in other republics of SFRY (BiH, Croatia, Montenegro, Macedonia, Slovenia and Serbia);
- Until 1 October 2008 permission for trade in BiH was in place only for plant protection products based on lindane and endosulfan;
- The Council of Ministers of BiH, on its 51<sup>st</sup> session, held on 3 June 2008, and at the proposal of the Administration for Plant Health Protection of BiH, banned the import and use of lindane and endosulfan in plant protection products, as published in the Official Gazette of BiH, no. 55/08 of 8 July 2008;
- Plant protection products formulated on the basis of POPs pesticides are not on the positive list of Annex I of the EU under Regulation (EC) No. 1107/2009, and therefore these agents may not obtain permit for import and use in BiH;
- Based on research data of the Faculty for Agriculture in Banja Luka, it was concluded that in the period 2000-2008, ending with 2007, through the border crossings Rača and Gradiška a total of 14,762 litres of formulations based on endosulfan and 20,678 litres of formulations based on lindane was imported in plant protection agents. The percentage share of imported products based on lindane out of the total quantity of insecticides, by year, in the period between 2000 and 2008 ranged from 0 to 3.89% and those based on endosulfan ranged from 0 to 6.44%, depending on the year;
- By analysis of data from the Agency for Statistics of BiH, it can be observed that a certain amount of goods (5,722 kg), under the tariff code 3808912000 was imported in the period 2008 – 2012 which indicates that the product in question is pesticide i.e. chlorinated hydrocarbon based insecticide. The POPs Pesticides Inventory Group has concluded that there is a possibility that there were POPs pesticides among imported goods. The share of products under the tariff code 3808912000 in the total share of imported insecticides for the period 2008-2013 amounted to 0.07-0.48%.
- According to data obtained from the Republic Administration for Inspection Affairs of Republika Srpska, the POPs Pesticides Inventory Group determined that there were no chemicals, which fall within POPs pesticides and are prohibited by the Decision of the Council of Ministers of BiH, among the chemicals found in the warehouses of distributors in Republika Srpska. During the developing of the inventory, the POPs Pesticides Inventory Group did not receive any response from the Federal Administration for Inspection Affairs, in relation to the situation regarding the presence of prohibited POPs pesticides in internal trade in FBiH. Based on the letter from the Inspectorate of the Brčko District in BiH, the POPs Pesticides Inventory Group concluded that, during the inspection conducted on the internal trade of the Brčko District in BiH, the agricultural inspection did not find any plant protection products without adequate documentation, nor did they find any plant protection products without documentation, and no plant protection products which were banned for sale in BiH.

Key issues in addressing the current situation in management of POPs pesticides, identified during developing the preliminary inventory, are the following:

- Lack of adequate legislation in the field of POPs pesticides and discrepancy in the adoption of laws and bylaws in FBiH, RS and BD - In FBiH and BD, the Law on Chemicals or the regulations which restrict or prohibit the manufacture, trade and use of certain chemicals, including POPs, are still not adopted. Furthermore, there is lack of regulations related to monitoring concentrations of POPs pesticides in the environment. In this regard, it is necessary to amend existing or adopt new regulations governing the monitoring and maximum permissible concentrations of POPs pesticides in the environment;
- Responsibility for the implementation of the Stockholm Convention generally, and for the management, control and monitoring of POPs (including POPs pesticides) is allocated among more than 10 institutions at the state level and at FBiH, RS and BD levels. Appropriate management of these chemicals is disabled by the lack of an appropriate legal framework and poor coordination between the relevant institutions;
- Inadequate customs tariffs – According to the preliminary inventory the existing customs tariffs are not adequate for detailed monitoring of imports of POPs pesticides. The Indirect Taxation Authority of BiH (Customs Sector) does not have an established special tariff for all pesticides that are listed on the Stockholm Convention. It is not possible to tell the type of the specific chemical on the basis of the existing customs tariffs, given that the tariffs are quite generalized, as was the case with the goods under customs tariff 3808912000 during the development of POPs inventory. The goods were imported under this customs tariff, in an amount of 5,722 kg, which indicates that they were insecticides based on chlorinated hydrocarbons, but they are prohibited and it is not possible to get a license for their import in BiH, not even as pesticides in plant protection products, nor as pesticides in biocides;
- Lack of clearly defined procedures for inventorying and registration of chemicals that have passed through the BiH border and entered the territory of BiH, and in that sense the Indirect Taxation Authority (Customs Sector) should strengthen border control. In RS an inventory of chemicals was developed and import and reporting procedures are defined;
- Lack of a fully constructed system for handling empty and used packaging of pesticides – The *Regulation on Duties of Users of Phytopharmaceutical Agents* (Official Gazette of BiH, no. 101/12) regulates the obligations of the users of phytopharmaceutical agents (PPA) relating to handling of empty containers and residues of PPA, wastes contaminated with PPA that occur during remediation of accidents and PPA which registration is no longer valid or are past their expiration dates indicated on the label. This Regulation conforms to the *Regulation on Principles of Good Agricultural Practices, Integrated Plant Protection and Duties of Users of Plant Protection Products* (Official Gazette of RS, no. 90/13). Even though there is an established legal framework, the preliminary inventory of POPs pesticides revealed that in practice, this system is not fully implemented;
- Inadequate monitoring of POPs pesticides – According to the preliminary inventory, results of the contents of POPs pesticides in samples of food, water and soil from the territory of BiH, are very few or not publicly available. The test results obtained by the POPs Pesticides Inventory Group are presented in Chapters 2.3.9 *Existing programs for monitoring emissions and the impact on the environment and health* and 2.3.14 *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*.

## 2.3.2 PRELIMINARY INVENTORY OF POLYCHLORINATED BIPHENYLS (PCBs) - ANNEX A, PART II OF THE STOCKHOLM CONVENTION

### 2.3.2.1 Introduction

Inventory of PCBs is part of the inventory of POPs in BiH, developed by the PCB Inventory Group within the framework of preparations for the implementation of the Stockholm Convention in BiH.

PCBs are synthetic organic aromatic compounds which were synthesized in 1866, but were industrially manufactured for the first time in 1929, in the chemical industry “Monsanto” (USA),

under the trade name “Askarel”. The chemical formula of the PCB is  $C_{12}H_{(10-n)}Cl_n$ , where n is a number of chlorine atoms within the range of 1-10. Theoretically, a total of 209 possible PCB congeners exist, but only about 130 of these are likely to occur in commercial products<sup>61</sup>.

Depending on the number of chlorine atoms in their molecules, the physical, chemical and toxicological properties of PCBs vary, but it was established that, as technical material, PCBs possessed a number of useful properties, which led to their wide use in the production of insulation materials, plastics, paints, varnishes, lubricants, adhesives, oils for hydraulic equipment, pesticides, printing inks, operational fluids for heat transfer and others. They were most frequently applied to dielectric fluids in the electrical power equipment as high-temperature insulation materials.

PCBs have been produced on an industrial scale for more than 50 years and have been exported as chemicals and in products to virtually every country in the world. Countries that have manufactured PCBs are Austria, China, Czechoslovakia, France, Germany, Italy, Japan, Russia, Spain, United Kingdom, and United States<sup>62</sup>. Production of PCBs was banned in the seventies of the last century (1972 in Japan, 1979 in the United States, 1983 in Italy, etc.).

Use of liquids containing PCBs may be:

- In closed applications – systems in which the PCBs are held completely within the equipment (insulation or coolant in transformers, dielectric fluid in capacitors). Under ordinary circumstances, no PCBs would be available for exposure to the user or the environment; however, PCB emissions may occur during equipment servicing/repairing and decommissioning, or as a result of damaged equipment;
- In partially closed applications – systems in which the PCB oil is not directly exposed to the environment, but may become so periodically during use (hydraulic fluids in equipment for lifting loads, in trucks and high-pressure pumps, switches, voltage regulators, etc.);
- In open applications – systems in which PCBs are in direct contact with their surroundings and thereby may be easily transferred to the environment (additive in adhesives, sealants (silicone) and anti-corrosive paints, lubricating fluid in oils and greases, products for laminating in paper manufacturing, etc.).

Due to poor management of these substances as raw materials and/or waste until 70's of the last century, and due to their persistent chemical structure and the fact that they are insoluble in nature, i.e. air, water and/or soil, these substances have entered the food chain of animals and humans as bio-accumulator. In addition to persistence in nature, PCBs have been demonstrated to cause negative effects: toxicity, genetic, teratogenic, mutagenic, carcinogenic effects<sup>63</sup>.

PCBs are included in POPs chemicals listed under Annex A of the Stockholm Convention. Annex A includes the chemicals for which the Parties to the Stockholm Convention are obliged to take actions to eliminate the production and use thereof. Pursuant to Article 6 of Annex A, the Parties are primarily required to identify and label the equipment, i.e. to carry out inventory development. Special exemptions for use or production are listed in the Annex and are applicable only to Parties which registered for them.

### 2.3.2.2 Process of developing the PCB preliminary inventory

The preliminary inventory of PCBs in BiH, was developed in accordance with “*Guidance for developing a national implementation plan for the Stockholm Convention on POPs*” (2012) and “*Guidelines for the Identification of PCBs and Materials Containing PCBs*” (UNEP, 1999). The preliminary inventory related to the PCB in closed systems.

The preliminary inventory of PCBs was carried out in the period from May to December 2013, and the process of developing the inventory is described in detail in Annex 6.

### 2.3.2.3 Analysis of available data on the equipment containing PCBs

With the purpose of obtaining data on equipment containing PCBs, in the period between 24 June and 26 August 2013 the PCB Inventory Group sent a total of 334 official letters and questionnaires to identified institutions and/or organizations in BiH that may have information

61 Guidelines for the Identification of PCBs and Materials Containing PCBs (UNEP, 1999)

62 Guidelines for the Identification of PCBs and Materials Containing PCBs (UNEP, 1999)

63 Ministry of Environment and Physical Planning of the Republic of Macedonia: National implementation plan of reduction and elimination of the persistent organic pollutants in the Republic of Macedonia, Skopje, 2004

on the equipment containing PCBs, as well as to industries and companies in BiH that could possess electrical equipment (transformers, capacitors, switches, etc.) in which PCB has been used.

The number of institutions and companies that submitted their responses is provided in Table 38.

**Table 38:**  
Number of institutions  
and companies that have  
provided data

Entity	Companies that have confirmed possession of PCB equipment	Companies that stated that they do not possess PCB equipment	Companies that have reported possession of electrical equipment for which they have no data on PCB presence in the equipment	Total number of responses
FBiH	9	36	12	57
RS	2	5	1	8
BD	0	0	0	0

During the development of the PCB inventory, the PCB Inventory Group found out that during the military siege (1992-1995) in BiH a large number of power generation equipment was damaged and many identification plates on these devices went missing as well. Representatives of institutions and/or organizations, industries and companies with which the meetings were held in the period from 18 to 27 November 2013 (Annex 6) have unofficially stated that, during the war, the oil (which includes PCB oil) from transformers was used as fuel for diesel-powered vehicles.

According to data obtained from the submitted letters and questionnaires, the PCB Inventory Group has determined that PCB mixtures were never manufactured in BiH, nor was there any production of equipment containing PCBs.

Based on legal regulations and the PCB inventory developed by the PCB Inventory Group, no production of PCBs or PCB containing equipment is foreseen. Furthermore, the PCB Inventory Group has determined that PCB liquids are still being used mainly in closed systems (in power generation equipment).

#### 2.3.2.4 Import of liquids containing PCB and equipment containing PCB

Based on the inventory (questionnaires and field visits), the PCB Inventory Group has determined that electric power equipment (transformers and capacitors) containing PCBs mainly came from regional factories:

- Minel - Ripanj,
- Avala - Belgrade in Serbia,
- Iskra – Semič in Slovenia.

Devices that were brought from Slovenia and Serbia until the year 1992 were not recorded, because until then Bosnia and Herzegovina was a part of SFRY.

For the period from 1992 to the present day it is not possible to obtain information on the import of equipment containing PCBs. In fact, the customs tariff, on the basis of which it is possible to obtain information on import of goods in BiH, has no specific tariff number for transformers/capacitors containing PCBs. However, the PCB Inventory Group received data from the Agency for Statistics of on the import and export of goods and their corresponding tariff codes (Table 39).

**Table 39:**  
Tariff codes in BiH for  
goods that may contain  
PCBs

Tariff code	Name
271091 00 00	Waste oils containing polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs)
3824 82 00 00	Mixtures and preparations containing polybrominated biphenyls (PBBs), polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCT)
8504	Electrical transformers, static converters (for example, rectifiers) and reactance reels and other inductors - Liquid dielectric transformers
8504 21 00 00	-- power not exceeding 650 kVA
8504 22	-- power exceeding 650 kVA, but not exceeding 10 000 kVA
8504 23 00 00	-- power exceeding 10 000 kVA
8532	Electrical capacitors, fixed, variable and adjustable

With the help of the data analysis provided by the Agency for Statistics of BiH, the PCB Inventory Group has concluded that app. 350 kg of PCBs were imported in the period from 2008 to 2013, as shown in Table 40.

Year of import	Quantity of imported liquids (kg) according to tariff code	
	271091 00	3824 82 00
2008	289	0
2009	0	0
2010	0	0
2011	0	0
2012	0	5
2013	55	0
<b>Total by the tariff</b>	<b>344</b>	<b>5</b>

**Table 40:**  
Total quantity of imported liquids in the period 2008 - 2013

### 2.3.2.5 Export of waste containing PCB

According to the data obtained from the Agency for Statistics and based on the documents of the Basel Convention<sup>64</sup>, the only export of PCBs from BiH refers to the export of waste containing PCBs, which was carried out in accordance with the principles and rules of the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal. This refers to the export of transformers, capacitors and other PCB wastes. Approximately a dozen licensed companies in BiH are engaged in the collection and disposal of hazardous waste and waste containing PCBs (Source: Federal Ministry of Environment and Tourism and the Ministry of Physical Planning, Civil Engineering and Ecology of RS). Some of the companies never exported<sup>65</sup>. According to the information received by the PCB Inventory Group from the representatives of the companies (JP Elektroprivreda HZHB, Kemis d.o.o. and Kemokop d.o.o.), export of waste containing PCBs was carried out by three companies in BiH: Grios d.o.o., Kemis d.o.o. and Kemokop d.o.o.

According to data from the Basel Convention in 2003 and 2006, nearly 131 tons of waste containing PCBs was exported from BiH, whereas according to the obtained data from the Agency for Statistics of BiH, nearly 2,500 tons of waste that may contain PCBs was exported in the period 2008-2013. Table 41 presents information on the quantities of exported waste that, given the existing customs tariff in BiH, may contain PCBs.

Year of export	Qty of exported liquids (kg) according to tariff codes: 271091 00 00	Qty of exported electrical equipment (kg) according to tariff codes: 8532 and 8504	Total exported quantities from BiH (kg)
2003			19,300
2006			112,360
2008	44,180	749,522	793,702
2009	216,700	509,920	726,620
2010	11,951	380,339	392,290
2011		354,952	354,952
2012		267,136	267,136
1 Jan - 1 Oct 2013		147,795	147,885
<b>TOTAL</b>			<b>2,814,155</b>

**Table 41:**  
Total quantity of exported waste that may contain PCB from BiH in 2003, 2006, 2008 - 2013

### 2.3.2.6 Results of the preliminary inventory of PCBs

Based on the PCB inventory, the PCB Inventory Group has concluded that PCBs in BiH are present in closed applications (transformers, capacitors and switches) and barrels used for storing used oil. In addition to the data obtained through questionnaires, the PCB Inventory Group conducted inspections on electric power equipment with the help of the identification plates and sampling in BiH in the period from 18 to 27 November 2013.

It should be noted that currently in BiH, in parallel with this project, the *Med Partnership Project* (The Strategic Partnership for the Mediterranean Large Marine Ecosystem) is in

<sup>64</sup> <http://www.basel.int/Countries/NationalReporting/ReportingDatabase/Datasources20032004/tabid/1609/Default.aspx>

<sup>65</sup> Ministry of Foreign Trade and Economic Relations BiH, State of the Environment Report 2012

progress i.e. the Sub-component 2.3. “Environmentally Sound Management of equipment, stocks and wastes containing or contaminated by PCBs in national electricity companies of Mediterranean countries (Albania, Bosnia and Herzegovina, Egypt and Turkey)” (2009 – 2013). The Sub-component 2.3. of the *Med Partnership Project* was developed by the Mediterranean Pollution Assessment and Control Programme (“MEDPOL”) in collaboration with the Cleaner Production Regional Activity Centre (“CPRAC”). MEDPOL and CPRAC are implementing the project in collaboration with the Ministry of Foreign Trade and Economic Relations of BiH. The project will enable the export of up to 200 tons of PCB oils and equipment containing or contaminated with PCBs from BiH in accordance with the principles of the Basel Convention, in order to ensure environmentally sound disposal of the PCB oils. The export is expected to take place by the end of 2014.

Within the framework of Sub-component 2.3 the PCB Inventory Group underwent training in management of polychlorinated biphenyls (PCBs) and practical training in taking samples and using the PBC Dexil L2000 DX analyser. The PCB Inventory Group organized the field visit to companies that own equipment containing or contaminated with PCBs, by combining the needs of the preliminary inventory of PCBs in BiH within this project and the needs of the *Med Partnership Project*. The industrial plants, organizations and/or institutions, visited by the PCB Inventory Group, were selected on the basis of the questionnaires in which the companies stated that they own equipment containing PCBs. The PCB Inventory Group visited the companies that stated that they own equipment containing PCBs and which were willing to cooperate and organize site visits.

Table 42 presents the number of listed equipment on site and the number of samples taken, whereas Figure 15 and Figure 16 show the locations on which the inspections, the listing of equipment and detecting the presence of PCBs in equipment took place and locations on which the samples were taken.

**Table 42:**  
Amounts of equipment  
inventoried on site and  
the number of samples  
taken

Entity	Company	Number of samples taken	Amounts of equipment			
			Transformers	Capacitors	Switches	Barrels
FBiH	PHPP “Čapljina”	2	9			
	“Elektrodistribucija” Sarajevo			208		
	“Elektrodistribucija” Zenica, TS 35/10 kV Maglaj II			6		
	“Elektrodistribucija” Zenica, TS 110/35 kV Tešanj			3		
	“Elektrodistribucija” Zenica, 10/0,4 Tešanj 2			12		
	Pobjeda Tešanj d.o.o.			48		
	Enker d.o.o.			11		
	“Elektrodistribucija” Zenica, TS 35/(20)10 Jelah	4		12		
	“Elektrodistribucija” Zenica, TS 10/0.4 kV Vitex 4			24		
	“Elektrodistribucija” Zenica, TS 110/35/10 kV Visoko			33		
	Subsidiary Company Brown Coal Mine “Zenica” d.o.o.	2	2	10		
	Subsidiary Company Brown Coal Mine “Breza” d.o.o.	4	1	50	1	1
	Subsidiary Company Brown Coal Mine “Đurdevik” d.o.o.	3	3			
	Kemokop d.o.o.			57		
Kemis d.o.o.		5	66		16	
RS	Jelšingrad Livar	2	2	0		
BiH		17	22	540	1	17





Figure 15: Locations on which the inspections, the listing of equipment and detecting the presence of PCBs in equipment took place



Figure 16: Locations on which the samples were taken

Table 43, Table 44 and Table 45, show the results of the inspections and sampling conducted by the PCB Inventory Group during field visits.

*Table 43:  
Results of inspection and  
sampling of transformers  
during field visits*

No.	Company	Location	Type	Name of manufacturer	Power kVA
1	Subsidiary Company Brown Coal Mine "Zenica" d.o.o.	GTS RUDNIK	NT 2500 35-5,25	Energoinvest	2,500
2	Subsidiary Company Brown Coal Mine "Zenica" d.o.o.	TS MOSCANICA	4VT 630/20-0,4	Energoinvest	630
3	Subsidiary Company Brown Coal Mine "Breza" d.o.o.	GTS - T3	KOU 1003 n/30	Siemens	2,500
4	Subsidiary Company Brown Coal Mine "Đurđevik" d.o.o.			Elektro Srbija	
5	Subsidiary Company Brown Coal Mine "Đurđevik" d.o.o.			Energoinvest	400
6	Subsidiary Company Brown Coal Mine "Đurđevik" d.o.o.			Rade Končar	
7	Kemis d.o.o.	Storehouse Kemis d.o.o.	99056	SAVOISIENNE	630
8	Kemis d.o.o.	Storehouse Kemis d.o.o..	99056	SAVOISIENNE	630
9	Kemis d.o.o.	Storehouse Kemis d.o.o.	99056	SAVOISIENNE	630
10	Kemis d.o.o.	Storehouse Kemis d.o.o.	99056	SAVOISIENNE	630
11	Kemis d.o.o.	Storehouse Kemis d.o.o.	DL 400/10	Volta-werke	400
12	Elektroprivreda HZHB	Hydro power plant "Čapljina"	DL5000/10	Volta-werke	4,800 /2,400 /2,400
13	Elektroprivreda HZHB	Hydro power plant "Čapljina"	DL5000/10	Volta-werke	4,801 /2,400 /2,400
14	Elektroprivreda HZHB	Hydro power plant "Čapljina"	DL1600/20	Volta-werke	1,600
15	Elektroprivreda HZHB	Hydro power plant "Čapljina"	DL1600/20	Volta-werke	1,600
16	Elektroprivreda HZHB	Hydro power plant "Čapljina"	DL1600/20	Volta-werke	1,740
17	Elektroprivreda HZHB	PHPP "Čapljina"	DL1600/20	Volta-werke	1,740
18	Elektroprivreda HZHB	Hydro power plant "Čapljina"	TCAJ5829K	Volta-werke	700
19	Elektroprivreda HZHB	Hydro power plant "Čapljina"	TCAJ5829K	Volta-werke	700
20	Elektroprivreda HZHB	Hydro power plant "Čapljina"	DL1600/20	Volta-werke	1,600
21	Jelšingrad Livar	Banja Luka	2VT1600/10-0,4	Energoinvest	1,600
22	Jelšingrad Livar	Banja Luka	TBNx2500-12	Rade Končar	2,500

*Table 44:  
Results of inspection and  
sampling of capacitors  
during field visits*

No.	Company	Location	Type	Name of manufacturer
1	Subsidiary Company Brown Coal Mine "Zenica" d.o.o.	TS RASPOTOCJE	KPV 7010	ISKRA
2	Subsidiary Company Brown Coal Mine "Breza" d.o.o.	TS 10/6 kV	KLS 1102	ISKRA
3	Kemokop d.o.o.	Storehouse Kemokop d.o.o.	KGV 1001	ISKRA
4	Kemis d.o.o.	Storehouse Kemis d.o.o.	KPVK-315T	ISKRA
5	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK-5003	ISKRA
6	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 7103	ISKRA
7	Kemis d.o.o.	Storehouse Kemis d.o.o.	KPVK 320T	ISKRA
8	Kemis d.o.o.	Storehouse Kemis d.o.o.	KPVK 320T	ISKRA
9	Kemis d.o.o.	Storehouse Kemis d.o.o.	KPVK 315T	ISKRA

Year of manufacture	Serial no.	Oil weight (t)	Total weight (t)	Inventory no.	Does it contain PCB (Yes, No)	Name of cooling liquid	Result in ppm	Operating status of the equipment (1. In use, 2. Out of use, 3. Waste)
1980	40250	1.4	6.6	I 0022	NO		3.21 ppm	In use
1986	63218	0.4		I 0020	NO		1.77 ppm	Out of use
	22738	1.5		B01	NO		1.57 ppm	In use
1967				D01	NO		3.56 ppm	In use
		0.4		D02	NO		2.08 ppm	In use
				D03	NO		2.23 ppm	In use
1964	315261	0.915	2.675	I004	YES	Pyralene		Waste
1964	315260	0.915	2.675	I004	YES	Pyralene		Waste
1964	315262	0.76	2.91	I004	YES	Clophen		Waste
1964	315263	0.76	2.91	I004	YES	Clophen		Waste
1978	52741-001	0.48	1.51	I004	YES	Clophen		Waste
1976	60216-001	5.42	14.3	HZHB 01	YES	Clophen		In use
1976	60216-002	5.42	14.3	HZHB 02	YES	Clophen		In use
1976	517732-001	2.36	6.03	HZHB 03	YES	Clophen		In use
1976	517732-002	2.36	6.03	HZHB 04	YES	Clophen		In use
1976	52071-001	2.36	5.91	HZHB 05	YES	Clophen		In use
1976	52071-002	2.36	5.91	HZHB 06	YES	Clophen		In use
1977	K2 31106	1.25	2.93	HZHB 07	YES	Clophen		In use
1977	K2 31105	1.25	2.93	HZHB 08	YES	Clophen		In use
1976	517732-003	2.36	5.91	HZHB 09	YES	Clophen		In use
1979	T-14854			I006	NO		4.77 ppm	In use
1978		2.075	8.5	I007	NO		1.69 ppm	In use

Power kVA	Year of manufacture	Serial no.	Number of same capacitors	Total weight (kg)	Inventory no.	Does it contain PCB (Yes, No, N/A)	Operating status of the equipment (1. In use, 2. Out of use, 3. Waste)
50	-	-	10	570	I 0021	YES	In use
50	-	-	50	1,150	B02	YES	Waste
47	1977	-	57	4,740	I001	YES	Waste
15	1968	20448	1	-	I003	YES	Waste
33.3	1983	126249	1	-	I003	NO	Waste
50	1983	170063	1	-	I003	NO	Waste
20	1967	16101	1	-	I003	YES	Waste
20	1967	16089	1	-	I003	YES	Waste
15	1968	20485	1	-	I003	YES	Waste

No.	Company	Location	Type	Name of manufacturer
10	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 5003	ISKRA
11	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 7103	ISKRA
12	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 5003	ISKRA
13	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 5003	ISKRA
14	Kemis d.o.o.	Storehouse Kemis d.o.o.	PMKS 833	MINEL RIPANJ
15	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 7103	ISKRA
16	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 7103	ISKRA
17	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 7103	ISKRA
18	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 7103	ISKRA
19	Kemis d.o.o.	Storehouse Kemis d.o.o.	KNK 7103	ISKRA
20	Kemis d.o.o.	Storehouse Kemis d.o.o.	TCC 20045	ITALFARAB
21	Kemis d.o.o.	Storehouse Kemis d.o.o.	CCF 20044	ITALFARAB
22	Kemis d.o.o.	Storehouse Kemis d.o.o.	MFA 56046	ITALFARAB
23	Kemis d.o.o.	Storehouse Kemis d.o.o.	PHFOWOC KS-ST	ELPHIAC
24	Kemis d.o.o.	Storehouse Kemis d.o.o.	BEZ OZNAKE	GERMANY AKA
25	"Elektrodistribucija" Sarajevo	Storage EDSA Azici		BICC English
26	"Elektrodistribucija" Zenica, TS 35/10 kV Maglaj II	TS 35/10 kV Maglaj II	KGV 3001	ISKRA
27	"Elektrodistribucija" Zenica, TS 110/35 kV Tesanj	TS 110/35 kV Tesanj	KGV 3001	ISKRA
28	"Elektrodistribucija" Zenica, 10/0,4 Tesanj 2	10/0,4 Tesanj 2	KNK 7103	ISKRA
29	"Elektrodistribucija" Zenica, 10/0,4 Tesanj 2	10/0,4 Tesanj 2	KPK 1003	ISKRA
30	"Elektrodistribucija" Zenica, 10/0,4 Tesanj 2	10/0,4 Tesanj 2	-	ISKRA
31	Pobjeda Tesanj	Inside company	-	ISKRA
32	Pobjeda Tesanj	Inside company	-	ISKRA
33	Pobjeda Tesanj	Inside company	-	ISKRA
34	Enker	Inside company	KNK 5003	ISKRA
35	"Elektrodistribucija" Zenica, TS 35/(20)10 Jelah	TS 35/(20)10 Jelah	PN-69-E-06090	-
36	"Elektrodistribucija" Zenica, TS 10/0.4 kV Vitex 4	TS 10/0.4 kV Vitex 4	KNK 5003	ISKRA
37	"Elektrodistribucija" Zenica, TS 110/35/10 kV Visoko	TS 110/35/10 kV Visoko	KIT 4011	ISKRA
38	"Elektrodistribucija" Zenica, TS 110/35/10 kV Visoko	TS 110/35/10 kV Visoko	KIT 4011	ISKRA
39	"Elektrodistribucija" Zenica, TS 110/35/10 kV Visoko	TS 110/35/10 kV Visoko	-	BOSH

*Table 45:  
Results of visual  
inspection and sampling  
of barrels and circuit  
breakers during field  
visits*

No.	Company	Location	Type	Name of oil
1	Subsidiary Company Brown Coal Mine "Breza" d.o.o.	TS 10/6 kV	Oil from barrel	Mineral oil
2	Subsidiary Company Brown Coal Mine "Breza" d.o.o.	TS 10/6 kV	Switch	TECHNOL V 3000
3	Kemis d.o.o.	Kemis d.o.o. storage	Oil from barrel	-

During the inventory development, the PCB Inventory Group collected, analysed and identified the total amounts of PCBs in closed applications (transformers, capacitors, switches) and barrels used for storage of used oils, based on data obtained through questionnaires, meetings and field visits carried out during the period from 18 to 27 November 2013. The equipment in closed and open systems was analysed according to the following criteria:

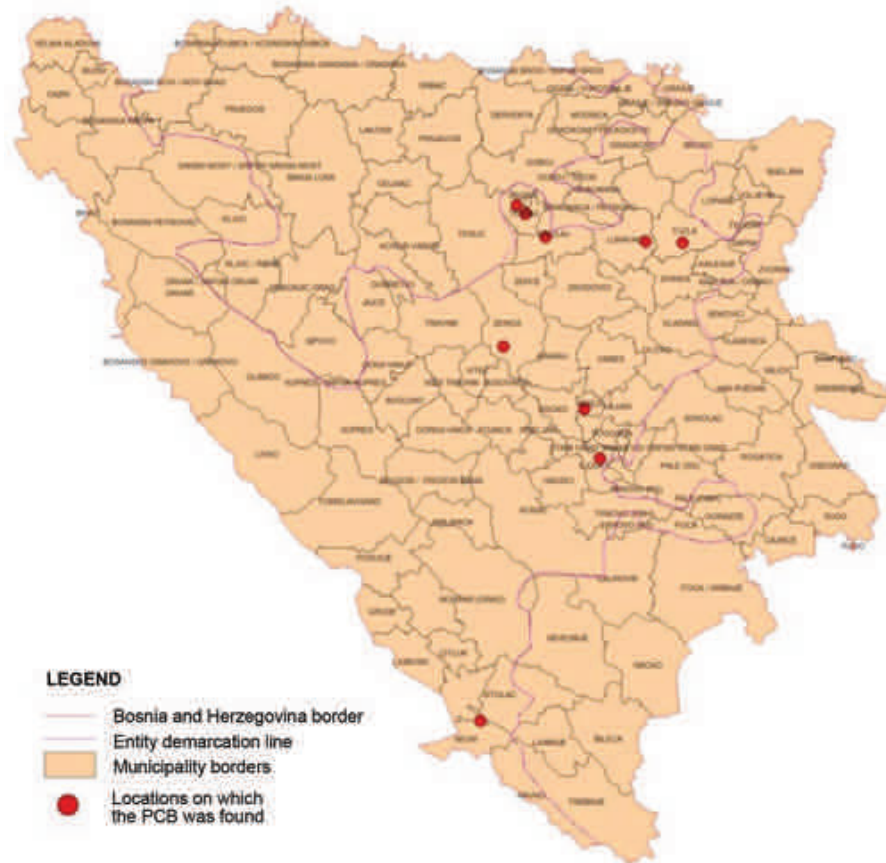
- The owner of equipment,
- The type and number of equipment,
- The total weight of oil,
- The factory name of oil,
- The total weight of capacitors,
- Geographical distribution of equipment per entities.

Power kVA	Year of manufacture	Serial no.	Number of same capacitors	Total weight (kg)	Inventory no.	Does it contain PCB (Yes, No, N/A)	Operating status of the equipment (1. In use, 2. Out of use, 3. Waste)
33.3	1983	126250	1	-	I003	NO	Waste
50	1988	170028	1	-	I003	NO	Waste
33.3	-	-	1	-	I003	NO	Waste
33.3	1983	126251	1	-	I003	NO	Waste
83.3	1984	36012	30	-	I003	YES	Waste
40	1990	186408	1	-	I003	YES	Waste
40	1990	186417	1	-	I003	YES	Waste
40	1990	186379	1	-	I003	YES	Waste
40	1990	186421	1	-	I003	YES	Waste
40	1990	186396	1	-	I003	YES	Waste
20	1995	10.02.0563	9	-	I003	YES	Waste
20	1995	08/30W	1	-	I003	YES	Waste
3.72	1988	08 06	1	-	I003	YES	Waste
10	1983	322005	1	-	I003	YES	Waste
-	-	-	9	-	I003	YES	Waste
-	-	-	208	6,878	EP01	YES	Waste
200	1979	-	6	342	I005	YES	Out of use
200	1979	-	3	171	I008	YES	Out of use
30	1990	-	6	342	I009	NO	In use
33.3	1979	-	3	69	I009	YES	In use
-	1979	-	3	171	I010	YES	In use
54	-	-	6	342	I011	NO	In use
25	-	-	12	276	I0011	YES	Out of use
54	-	-	30	1,710	I0012	YES	Waste
50	1986	-	11	627	I0013	NO	In use
-	-	-	12	684	I0014	YES	Waste
-	1985	-	24	360	I0015	NO	In use
-	1986	-	9	513	I0016	NO	Out of use
-	1986	-	9	306	I0017	NO	Out of use
-	1986	-	15	75	I0018	No data	Out of use

Total weight (kg)	Inventory no.	Does it contain PCB (Yes <sup>66</sup> No)	Result in ppm
-	B03	NO	0.78 ppm
5l per pole	B04	NO	5.60 ppm
3,200	I02	YES	

Table 46, Table 47 and Table 48 present the data on the total number and amount of equipment containing PCBs obtained by the PCB Inventory Group through questionnaires, meetings and field visits, and Figure 17 shows the map with the locations where the equipment containing PCBs was found.

**Figure 17:**  
Locations where the  
equipment containing  
PCBs was found



**Table 46:**  
Total amounts of PCBs in  
transformers in BiH

Entity	Company	Transformers in which the presence of PCBs is known		
		1	2	3
		Total no.	Number of transformers in which the quantity of dielectrics is known	The amount of dielectrics from (2) in tons
FBiH	Bira d.d.	-	-	-
	Natron-Hayat d.o.o.	-	-	-
	Famos ADI d.o.o.	-	-	-
	GRAS Sarajevo d.o.o.	-	-	-
	BFM d.o.o.	-	-	-
	Fortuna d.d.	-	-	-
	Herceg d.o.o.	-	-	-
	BNT Machinery and Hydraulics Factory d.d.	-	-	-
	Cantonal Hospital Zenica	-	-	-
	Institute for Emergency and Medical assistance of Canton Sarajevo	1	-	-
	Subsidiary Company Brown Coal Mine "Zenica" d.o.o.	-	-	-
	Subsidiary Company Brown Coal Mine "Breza" d.o.o.	-	-	-
	Subsidiary Company Brown Coal Mine "Đurđevik" d.o.o.	-	-	-
	Subsidiary Company Brown Coal Mine "Abid Lolic"	-	-	-
	Public Enterprise Elektroprivreda Hrvatske zajednice Herceg Bosne d.d. Mostar	9	9	-
Ministry of Defence	-	-	-	
Kemis d.o.o.	5	5	3.83	
RS	Jelšingrad Livar	-	-	-
	Mine and TPP Stanari d.o.o.	16	16	6.94
	Mine and TPP Gacko a.d.	-	-	-
	Alunima d.o.o. Zvornik	12	12	-
BiH	43	42	10.77	

Entity	Company	Capacitors in which the presence of PCBs is known		Capacitors in which the presence of PCBs is suspected
		Total no.	Total weight in tons	Total no.
FBiH	Famos ADI d.o.o.	-	-	12
	"Elektrodistribucija" Sarajevo	208	6.88	-
	"Elektrodistribucija" Zenica	90	2.69	-
	Pobjeda Tešanj	48	1.99	-
	Enker d.o.o.	11	0.63	-
	Subsidiary Company Brown Coal Mine "Breza" d.o.o.	50	1.15	-
	Subsidiary Company Brown Coal Mine "Zenica" d.o.o.	10	0.57	-
	Kemokop d.o.o.	57	4.74	-
	Kemis d.o.o.	66	2.4	-
RS	Jelšingrad Livar	114	-	-
	Mine and TPP Stanari d.o.o.	7	-	-
BiH		661	21.04	12

Table 47:  
Total amounts of PCBs in capacitors in BiH

Entity	Company	Switches in which the presence of PCBs is suspected		Barrels in which the presence of PCBs is known
		Total no.	Total weight in tons	Total no.
FBiH	Subsidiary Company Brown Coal Mine "Zenica" d.o.o.	50	2.40	-
	Subsidiary Company Brown Coal Mine "Đurdevik" d.o.o.	11	1.50	-
	Kemis d.o.o.	-	-	3.20
BiH		61	3.90	3.20

Table 48:  
Total amounts of PCBs in switches and barrels in BiH

Transformers in which the presence of PCBs is suspected						
	4	5	6	7	8	9
	Number of transformers whose total weight in tons is known	Total weight of transformers from (4) in tons	Total no.	Number of transformers in which the quantity of dielectrics is known	The amount of dielectrics from (7) in tons	Number of transformers whose total weight is known
	-	-	1	-	-	-
	-	-	55	43	44.79	-
	-	-	1	-	-	-
	-	-	20	20	24.00	-
	-	-	1	-	-	-
	-	-	1	-	-	-
	-	-	3	-	-	-
	-	-	11	11	8.83	-
	-	-	2	-	-	-
	-	-	-	-	-	-
	-	-	15	15	14.20	-
	-	-	19	6	11.05	-
	-	-	43	41	28.74	-
	-	-	9	9	3.2	-
	9	27.15	-	-	-	-
	-	-	15	10	2.78	-
	-	-	-	-	-	-
	-	-	14	10	8.62	-
	-	-	-	-	-	-
	-	-	43	23	17.79	-
	12	30.60				
	21	57.75	253	188	164.00	0

### 2.3.2.7 Existing stockpiles and wastes containing PCBs

Stocks of PCBs refer to equipment containing PCBs, which is, although functioning, not put into operation but serves as a backup in case of failure of one of the devices in use, and liquid PCB in storage. According to the data submitted by the company JP Elektroprivreda HZHB, there is one registered transformer with PCBs, held in reserve, located in PHPP Čapljina, weighing 5.91 t. During the inventory developed by the PCB Inventory Group, no capacitors were found in stocks.

Based on the definitions of the Basel Convention, waste materials containing PCBs include:

- transformers and capacitors containing PCBs, put out of operation and not intended for further use,
- waste liquids containing PCBs,
- solid wastes containing PCBs (metals, non-metals, soil contaminated with PCBs), which may occur due to leakage and damage of equipment or remediation and cleaning of facilities and sites that are contaminated with PCBs.

Based on the inventory conducted by the PCB Inventory Group (by conducting field visits and subsequently collecting information after the Preliminary Inventory Workshop, held in Banja Luka on 18 February 2014), the total amount of wastes containing PCBs, which is ready to be exported from BiH for final disposal and destruction, amounts to 106,167 kg, out of which 72% of which are capacitors, 25% transformers and 3% oil in barrels (Table 49).

*Table 49:  
Total quantity of PCB  
containing waste ready  
for export from BiH*

Entity	Company	Transformers (kg)	Capacitors (kg)	Barrelled oil (kg)
FBiH	“Elektrodistribucija” Sarajevo		7,874	405
	„Elektrodistribucija” Zenica, TS 35/10 kV Maglaj II		342	
	“Elektrodistribucija” Zenica, TS 110/35 kV		171	
	Elektrodistribucija” Zenica, 10/0,4 Tešanj 2		240	
	“Pobjeda” Tešanj d.o.o.		1,986	
	Enker d.o.o.		627	
	“Elektrodistribucija” Zenica, TS 35/(20)10 Jelah		684	
	“Elektrodistribucija” Zenica, TS 10/0.4 kV Vitex 4		360	
	“Elektrodistribucija” Zenica, TS 110/35/10 kV Visoko		513	
	“Elektrodistribucija” Zenica, TS 110/35/10 kV Visoko		306	
	“Elektrodistribucija” Zenica, TS 110/35/10 kV Visoko		75	
	Subsidiary Company Coal mine “Zenica” d.o.o.		570	
	Subsidiary Company Coal mine “Đurdevik” d.o.o.		1,150	
	Kemokop d.o.o.		4,740	
	Grioss d.o.o.	60,000	4,140	
Kemis BiH d.o.o.	16,510	595	3,200	
RS	Kemokop d.o.o. Modriča		1,679	
<b>BiH</b>		<b>76,510</b>	<b>26,052</b>	<b>3,605</b>
<b>Total quantities in BiH</b>		<b>106,167</b>		

During the inventory development, the PCB Inventory Group concluded that there are no facilities for treatment of PCBs and/or PCB waste on the territory of BiH, but that this type of waste is exported for final disposal, based on the guidelines of the Basel Convention. Furthermore, the PCB Inventory Group determined that there are companies engaged in the export of PCB equipment in BiH, and during the field visits the Group also found out that the companies (Kemis d.o.o. and Kemokop d.o.o.) have areas for temporary storage of hazardous waste including PCBs in their surroundings.



It is expected that the identified 106,167 tonnes of waste containing PCBs, which is now ready to be exported from BiH, will be possible to be exported from BiH and disposed of in an environmentally sound manner, in accordance with the principles of the Basel and Stockholm Convention, under Sub-components 2.3 of the *Med Partnership Project* which is in BiH implemented by MEDPOL and CPRAC. The export is expected to take place by the end of 2014.

### 2.3.2.8 Locations potentially contaminated with PCBs

During equipment inspections and sampling, the PCB Inventory Group detected the following potential sites contaminated with PCBs (Figure 18, Table 50):



*Figure 18:*  
Locations assumed to be contaminated with PCBs

Location	Municipality	Company
TS 35/(20)10 Jelah	Jelah	"Elektrodistribucija" Zenica
TS 10/6 kV	Đurđevik	Subsidiary Company Coal mine "Đurđevik" d.o.o.
TS 10/6 kV	Breza	Subsidiary Company Coal mine "Breza" d.o.o.

*Table 50:*  
Potential locations contaminated with PCB in BiH

During the field visit to Elektrodistribucija Zenica in TS 35/(20) 10 kV Jelah, the PCB Inventory Group found out that there was leakage of PCBs<sup>67</sup> from capacitors which were stored underground (buried in the ground) without taking any precautionary measures. It is assumed that PCBs leaked out from the capacitors because the equipment had corroded due to poor waste disposal. A view of the location is shown in Figure 19. Information about an explosion of capacitors was provided by the staff of the Subsidiary Company Brown Coal Mine "Đurđevik" d.o.o. in TS 10/0.6 kV. There is an unpleasant odour that resembles the smell of PCBs in the room where the capacitors were placed. During field visits to Subsidiary Company Brown Coal Mine "Breza" d.o.o., the PCB Inventory Group detected leakage of PCB<sup>68</sup> fluids from dielectric capacitors that are stored in the open as shown in Figure 20. The PCB Inventory Group was unable to examine the quantity of leaked fluids on the aforementioned locations.

<sup>67</sup> Based on the samples taken from the capacitors and the oil analysis performed by the PCB Inventory Group using qualitative technique, the capacitors contained pure PCBs.

<sup>68</sup> Based on the samples taken from the capacitors and the oil analysis performed by the PCB Inventory Group using qualitative technique, the capacitors contained pure PCBs.

**Figure 19:**  
Location potentially  
contaminated with PCBs,  
Elektrodistribucija  
Zenica TS 35/(20)10  
Jelah



**Figure 20:**  
Location potentially  
contaminated with PCBs,  
Subsidiary Company  
Brown Coal Mine  
"Breza" d.o.o.



### 2.3.2.9 Existing legal framework in the field of PCBs

Management of POPs chemicals in BiH, including PCBs, import/export, transportation and use of POPs chemicals, prohibitions and restrictions with regard to the production, distribution and use of POPs chemicals, disposal and transportation of hazardous waste is described in *Chapter 2.2.5 Management of POPs Chemicals*.

#### **Legally permissible concentrations of PCBs in the environment, food and working environment in BiH**

##### *Environment*

The *Decree on Hazardous and Noxious Substances in Water* (Official Gazette of FBiH, no. 72/09) prescribes the maximum allowed concentrations of substances in FBiH per individual classes of water, considered to be hazardous and noxious in accordance with Article 121, Paragraphs 2 and 3 of the *Law on Water* (Official Gazette of FBiH, no.70/06).

In Republika Srpska, the *Decree on Water Classification and Categorization of Watercourses* (Official Gazette of RS, no. 42/01) prescribes, for individual elements of chemical and sanitary-microbiological status, the numerical limit values based on corresponding numerical values defined in international and/or national standards of European countries and the hydrochemical characteristics of surface waters in RS.

In accordance with the provisions of the above mentioned Regulations, Table 51 below shows the maximum permissible concentration of PCBs in the waters of FBiH and RS.

Class of watercourse				
I	II	III	IV	V
FBiH				
0.02 µg/l	0.02 µg/l	0.20 µg/l	0.20 µg/l	-
RS				
<0.01 mg/m <sup>3</sup>	<0.02 mg/m <sup>3</sup>	0.02-0.04 mg/m <sup>3</sup>	0.04-0.06 mg/m <sup>3</sup>	>0.06 mg/m <sup>3</sup>

**Table 51:**  
Potential locations  
contaminated with PCB  
in BiH

Limit values of PCBs in industrial wastewaters that can be discharged into surface waters or public sewage are defined in FBiH by the *Decree on Conditions for Discharging Wastewaters into Natural Recipients and Public Sewerage System* (Official Gazette of FBiH, no. 4/12) and in RS by the *Regulation on Conditions for Discharging Wastewater into Surface Waters* (Official Gazette of RS, no. 44/01) and the *Regulation on Conditions for Discharging Wastewater into the Public Sewerage System* (Official Gazette of RS, no. 44/01).

Parameter	Unit	Emission limit values of industrial wastewater discharged into	
		Surface water bodies	Public sewage system
FBiH			
Total chlorinated biphenyls (PCBs)	mg/l	0.01	0.01
RS			
Sum of polychlorinated biphenyls (PCBs)	mg/m <sup>3</sup>	20	20

**Table 52:**  
Maximum permissible  
concentrations of PCB in  
industrial wastewaters

The *Regulation on Determining Permissible Amounts of Harmful and Hazardous Substances in Soil and their Method of Testing* (Official Gazette of FBiH, no. 72/09) determines the substances that are considered pollutants of agricultural land and their allowed limit values in soil, sludge and all municipal wastewater products, in liquid manure, organic fertilizers, mineral fertilizers, soil improvers, plant protection products, as well as the measures for preventing soil pollution, methods for determining the allowed amounts of harmful and hazardous substances, and the monitoring, prevention, protection and remediation of polluted soil.

Medium	Limit values
Soil	0.2 mg/kg
Sludge and all products from municipal wastewaters	0.05 mg/kg

**Table 53:**  
Limit values (maximum  
allowed amounts) of  
PCBs in soil and sludge  
in FBiH

According to the data collected by the POPs Legislation Group, there are currently no regulations defining the maximum allowed concentrations of hazardous and harmful substances in soil in Republika Srpska and Brčko District.

#### Foodstuffs and drinking water

The *Regulation on Maximum Permitted Levels for Certain Contaminants in Foodstuffs* (Official Gazette of BiH, no. 37/09) defines the maximum permitted levels of dioxin-like polychlorinated biphenyls (PCBs) in foodstuffs and the measures needed to be taken in case these maximum permitted levels are exceeded. The provisions of the Regulation are harmonized with EU regulations.

Methods of sampling and analysis for the official control of dioxins and furans in foodstuffs are defined by the *Regulation on Methods of Sampling and Analysis for the Official Control of Levels of Dioxins and Dioxin-like PCBs in Foodstuff* (Official Gazette of BiH, no. 43/09), which specifies the sampling methods, the analysis methods and the quality assurance issues in laboratories.

**Table 54:**  
Maximum permitted  
levels of dioxin-like  
PCBs in foodstuff

Item	Foodstuff	Maximum permitted level (MPL)
		Total dioxins and dioxin-like PCBs (WHO-PCDD/ F-PCB-TEQ)
1	Meat and meat products (excluding edible offal) of the following animals	
	- bovine animals and sheep	4.5 pg/g fat
	- poultry	4.0 pg/g fat
	- pigs	1.5 pg/g fat
2	Liver of terrestrial animals referred to in item 1, and derived products thereof	12.0 pg/g fat
3	Muscle meat of fish and fishery products and products thereof, with the exemption of eel. MPL refer to crustaceans, except brown crab meat and head and thorax of lobster and similar large crustaceans (Nephropidae and Palinuridae)	8.0 pg/g wet weight
4	Muscle meat of wild caught eel ( <i>Anguilla anguilla</i> ) and products thereof	12.0 pg/g wet weight
5	Raw milk and dairy products, including butter fat	6.0 pg/g fat
6	Hen eggs and egg products	6.0 pg/g fat
7	Animal fats:	
	- bovine animals and sheep	4.5 pg/g fat
	- poultry	4.0pg/g fat
	- pigs	1.5 pg/g fat
8	Mixed animal fats	3.0 pg/g fat
9	Vegetable oils and fats	1.5 pg/g fat
10	Marine oils (fish body oil, fish liver oil and oils of other marine organisms intended for human consumption)	10.0 pg/g fat
11	Fish liver and derived products thereof with the exception of marine oils referred to in item 10	25.0 pg/g wet weight

In BiH, the *Regulation on Methods of Sampling and Analytical Methods for Implementation of Official Controls of Feed* (Official Gazette of BiH, no. 65/13), which is compliant with EC Regulation 152/2009 which in Annex V lays down in provisions for determination of levels of dioxins and PCBs. Given that, in relation to Annex V, EU Regulation 709/2014 of 20 June 2014 has been adopted, BiH legislation will need to be harmonized with this Regulation in terms of determination of dioxins and PCBs.

In Republika Srpska, the *Regulation on Hygienic Quality of Drinking Water* (Official Gazette of RS, no.40/03) prescribes the maximum allowable concentration of PCBs in drinking water at levels of 0.0005 mg / l. Furthermore, this Regulation provides that bottled natural and processed drinking water, as well as bottled natural mineral water for drinking must not contain organochlorine compounds other than pesticides (PCB RST) and polychlorinated biphenyls (PCBs) and terphenyls (PCT).

#### Work environment

The *Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces* (SFRY, 1991) determines the maximum permissible concentrations (MPC) at worksites, and the list of regulated substances includes PCB.

**Table 55:**  
Maximum permissible  
concentrations (MPC) at  
worksites

Substance	MPCs		
	mol/m <sup>3</sup>	mg/m <sup>3</sup>	cm <sup>3</sup> /m <sup>3</sup>
Polychlorinated biphenyls (chlorine content 42%)	-	1	0.1

Furthermore, the above mentioned Standard stipulates that if two or more gases, vapours, mists, fumes or dust are found at the same time in the atmosphere of worksites, the opinion of the competent institutions must be obtained with regards to the assessment of the health risks to employees and the need to carry out protective occupational measures<sup>70</sup>.

<sup>69</sup> Sum of dioxins and dioxin-like PCBs (sum of PCDD, PCDF and PCBs), expressed as World Health Organisation (WHO) toxic equivalent using the WHO-toxic equivalency factors (WHO-TEFs). WHO-TEFs for human risk assessment based on the conclusions of WHO meeting held in Stockholm, Sweden, from 15 to 18 June 1997 (Van den Berg et al., (1998) Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and for Wildlife. *Environmental Health Perspectives*, 106 (12), 775)

<sup>70</sup> The competent authorities for occupational health and protection are the Ministry of Labour and Social Policy in FBiH, the Ministry of Labour and Protection of War Veterans and Disabled Persons in RS and the Education Department in BD.

### Management of PCB containing waste

In BiH, waste management is regulated by entity laws and by-laws in the field of waste management, as well as relevant international conventions, in the manner described in *Chapter 2.2.5 Management of POPs chemicals*.

According to the Basel Convention, “waste substances and items containing or contaminated with polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBB)” (code Y10) are classified as waste that must be controlled, i.e. as hazardous waste (Appendix I).

Article 58 of the *Law on Waste Management in RS* (Official Gazette of RS, no. 111/13) regulates POPs waste in general and stipulates the obligation of the owner of POPs wastes to report the type and amount of POPs wastes to the Ministry responsible for spatial planning, construction and ecology, and Article 57 of the Law specifically regulates PCB waste and stipulates that PCB containing waste must be collected separately. All equipment containing PCBs, and premises or facilities in which they are located, as well as decontaminated equipment must be labelled. The owner of PCBs or PCB waste is obliged to ensure their disposal or decontamination.

The Law prohibits:

- a. refilling of transformers with PCBs,
- b. re-use of PCB waste,
- c. obtaining PCBs through recycling PCB waste
- d. temporary storage of PCBs, PCB waste or PCB containing equipment for more than two years before ensuring their disposal or decontamination
- e. use of equipment containing PCBs unless they are in good working order or if they leak.

The owner of equipment in use containing PCBs or for which there is a possibility that they may be contaminated with PCB content is obliged to test the PCB content through accredited laboratories for waste testing. The owner of equipment containing more than 5 dm<sup>3</sup> of PCBs or the person responsible for the maintenance of such devices is obliged to report the device to the above mentioned Ministry, submit a plan for replacement or disposal and decontamination of the device, ensure the disposal or decontamination of the device, and inform the Ministry about any changes to the data relating to the device within three months from the date of change.

Persons dealing with the collection, treatment, decontamination or disposal of PCB waste must be licensed, keep records of collected, treated or disposed quantities, and submit such information to the Environmental Protection and Energy Efficiency Fund of RS, which keeps a register of PCB containing devices in use.

Furthermore, Article 55 of the Law, which regulates waste from electrical and electronic products, prescribes that components of waste from electrical and electronic products that contains PCBs must be separated and their proper disposal ensured.

According to the *Regulation on Waste Categories with Lists in FBiH* (Official Gazette of FBiH, no. 9/05), the *Regulation on Waste Categories with Catalogue in RS* (Official Gazette of RS, no. 39/05) and the *Regulation on Waste Categories with Lists in BD* (Official Gazette of BD, no. 32/06), PCB containing waste is listed under the following key numbers:

- 13 01 01\* - hydraulic oils containing PCBs
- 13 03 01\* - insulating oils or heat transfer oils containing PCBs
- 16 01 09\* - components containing PCBs (within waste not otherwise specified in the Catalogue – old vehicles from different means of transportation and waste from dismantling of old vehicles and vehicle maintenance)
- 16 02 09\* - transformers and capacitors containing PCBs
- 16 02 10\* - old equipment containing PCBs or contaminated with PCBs, not listed under 16 02 09
- 17 09 02\* - construction waste and demolition waste containing PCBs

The *Decree on Selective Collection, Packaging and Labelling of Waste in FBiH* (Official Gazette of FBiH, no. 38/06) prescribes the measures for selective collection, identification, storing, packaging and labelling of waste prior to disposal, transport or transfer to another entity authorized for reuse or disposal of components, in a manner that protects human health, the environment and encourages the reuse of components and reuse of waste. This Regulation covers used oils containing polychlorinated biphenyls / polychlorinated terphenyls (PCB/PCT).

In the Federation of BiH, Annex 3 of the *Regulation on Waste from Electrical and Electronic Products* (Official Gazette of FBiH, no. 87/12) prescribes that capacitors containing polychlorinated biphenyls (PCBs) must be separated from the collected waste equipment. In Republika Srpska and Brčko District, by-laws regulating this area have not been adopted.

Annex 5 provides a parallel overview of management of PCBs according to regulations on the level of BiH, FBiH, RS and BD.

### EU legislation in the field of PCB management

Bosnia and Herzegovina, as a potential candidate country for EU membership, assumed the obligation to harmonize its legislation with the EU legislation on the day of the signing of the Stabilization and Association Agreement (16/6/2008).

The key EU legislation dealing with PBC management is as follows:

- Council Directive (96/59/EZ) of 16 Sept 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB / PCT) – the purpose of this Directive is to harmonize the legislation of the Member States on the controlled disposal of PCBs, the decontamination or disposal of equipment containing PCBs and / or the disposal of used PCBs, in order to eliminate them completely, pursuant to the provisions of this Directive;
- Regulation (EC) No 850/2004 of 29 April 2004 on Persistent Organic Pollutants substances (POPs)
- Commission Regulation (EC) 1881/2006 of 19 December 2006, setting maximum levels for certain contaminants in foodstuffs (including dioxins and dioxin-like polychlorinated biphenyls (PCBs)
- Commission Regulation (EC) 1883/2006 of 19 December 2006, laying down methods of sampling and analysis for the official control of levels of dioxins and dioxin-like PCBs in certain foodstuffs
- Council Directive 2006/88/EC of 6 February 2006, on reducing the presence of dioxins, furans and PCBs in food and feed
- Commission Recommendation 2006/794/EC of 16 November 2006, on the monitoring of background levels of dioxins, dioxin-like PCBs and non-dioxin-like PCBs in foodstuffs
- Regulation 689/2008 and the new Regulation 649/2012 on export and import of hazardous chemicals (including PCBs substances).

### 2.3.2.10 Conclusions

Based on the preliminary inventory of PCBs (questionnaires and field visits), the PCB Inventory Group has concluded that in BiH there is no production of PCBs, however equipment containing PCBs is still being used. The presence of PCBs was detected in closed applications (transformers, capacitors and switches) and barrels used for storing used oil. Electric power equipment (transformers and capacitors) containing PCBs mainly comes from local factories: Minel – Ripanj and Avala - Belgrade in Serbia, Iskra - Semič in Slovenia.

For the period from 1992 to the present day the PCB Inventory Group was unable to obtain data on the import of equipment containing PCBs. Namely, the Indirect Taxation Authority of BiH (Customs Sector), which is responsible for import and export procedures, payment of customs duties as well as for preventing the import of banned goods and substances, has no specific tariff heading for transformers/capacitors containing PCBs. According to data provided by the Agency for Statistics of BiH, in the period from 2008 to 2013, a total amount of approximately 350 kg of PCBs were imported, namely 344 kg of waste oil containing PCBs, polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBB) and 5 kg of mixtures and preparations containing PCBs, PCTs and PBBs.

According to data from the Basel Convention in 2003 and 2006, nearly 131 tons of waste containing PCBs was exported from BiH, whereas according to the obtained data from the Agency for Statistics of BiH, nearly 2,500 tons of waste containing PCBs was exported in the period 2008-2013.

During site visits to companies that indicated that they might possess equipment containing or contaminated with PCBs, and which were willing to cooperate and organize site visits, the PCB Inventory Group found that total quantity of waste containing PCB, which is now ready to be exported from BiH, amounted to 106,167 tonnes of which about 72% are capacitors, 25% transformers and 3% oil in barrels.

Key issues in addressing the current situation in management of PCBs, specified by the PCB Inventory Group during developing the preliminary inventory, are the following:

- Lack of adequate legislation in PCB management and discrepancy in the adoption of laws and bylaws in FBiH, RS and BD - In FBiH and BD, the Law on Chemicals or the regulations which restrict or prohibit the manufacture, trade and use of certain chemicals, including PCBs, have not yet been adopted. In RS, the *Regulation Amending the Regulation on Conditions for Restricting and Prohibiting the Manufacture, Trade and Use of Chemicals* (Off. Gazette of RS, no. 100/10, 63/13), which was adopted on the basis of the *Law on Chemicals* (Off. Gazette of RS, no. 25/09), prohibits the production and use of PCBs, noting that the use of devices containing PCBs that are in use is permitted, inasmuch as it is not in contradiction with the conditions outlined in the regulations governing the disposal of PCBs/PCTs. Transport and trade of PCBs are regulated by legislation on transport of hazardous chemicals (i.e. substances and poisons), transboundary movements of waste and the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal, which was ratified by BiH in 2000. In FBiH, RS and BD regulations on handling and disposal of equipment containing PCBs/PCTs (including the use of PCBs in closed systems and defining the deadlines for replacing existing devices containing PCB) have not yet been adopted. Furthermore, there are no regulations that define the deadline for the final disposal of waste containing PCBs (liquids and equipment containing more than 0.005% of PCBs by weight). In FBiH and BD there are no regulations that prohibit the recovery, recycling, reclamation, direct reuse or alternative use of liquids containing more than 0.005% of PCBs by weight, whereas in RS the *Law on Waste Management* (Off. Gazette of RS, no. 111/13) prohibits refilling of transformers with PCBs, re-use of PCB waste, recycling PCBs from PCB waste, temporary storage of PCBs, PCB waste or devices containing PCBs for more than two years without ensuring their final disposal or decontamination, and the use of devices containing PCBs unless they are in good working order or undamaged. In FBiH, RS and BD regulations governing the monitoring and maximum permissible concentrations of PCBs in the environment are not in line with EU legislation and the provisions of the Stockholm Convention, and therefore it is necessary to amend them and/or adopt new regulations;
- Responsibility for the implementation of the Stockholm Convention generally, and for the management, control and monitoring of POPs (including PCBs) is allocated among more than 10 institutions at the state level and at FBiH, RS and BD levels. Appropriate management of these chemicals is disabled by the lack of an appropriate legal framework and poor coordination between the relevant institutions;
- Lack of records of equipment containing or contaminated with PCBs in authorized state and entity institutions of BiH - During the drafting of the preliminary inventory of POPs it was established that in BiH, a detailed inventory of PCBs (detailed listing and labelling of all devices and applications that contain PCBs) in order to implement management measures and environment protection measures was never carried out until the development of this project;
- Lack of records of sites contaminated with PCBs – The preliminary inventory revealed that in competent institutions in BiH, there is no basic information on potential sites contaminated with POPs chemicals (potential “hot-spots”), including PCBs;
- Inadequate customs tariffs - The Indirect Taxation Authority of BiH (Customs Sector) does not have an established special tariff heading for transformers/capacitors containing PCBs. Customs Tariff of BiH recognizes only the following tariff headings:
  - Waste oils containing PCBs, PCTs or PBBs (polybrominated biphenyls) – tariff code: 2710 91 00 00

- Mixtures and preparations containing PCBs, PCTs or PBBs - tariff code: 3824 82 00 00
- Lack of knowledge on PCBs - During the inspection of equipment and sampling of liquids that may contain PCBs, conducted in cooperation with representatives of companies that own equipment containing PCBs, it was noticed that employees lack knowledge concerning the proper methods of managing PCBs and its negative impacts on the environment and human health;
- Inadequate storage – During the PCB Inventory Group's field visit, it was noted that certain companies do not have adequate storage facilities for equipment contaminated with PCBs (e.g. Elektrodistribucija Zenica in TS 35/(20) 10 kV Jelah and Subsidiary Company Brown Coal Mine "Breza" d.o.o., etc.).

### 2.3.3 PRELIMINARY INVENTORY OF POLYBROMINATED DIPHENYL ETHERS (PBDEs), PERFLUOROOCANE SULFONIC ACID (PFOS) AND HEXABROMOBIPHENYL (HBB) - ANNEX A, PART I OF THE STOCKHOLM CONVENTION

The preliminary inventory of polybrominated diphenyl ethers (PBDEs) and perfluorooctane sulfonic acid (PFOS) was performed by the PBDEs/PFOS Inventory Group as part of the overall inventory of POPs in BiH, developed within the framework of preparations for the implementation of the Stockholm Convention on POPs.

This section presents the preliminary inventory PDBEs, while the inventory of PFOS is shown in *Chapter 2.3.5 Preliminary inventory perfluorooctane sulfonate (PFOS), its salts perfluorooctane sulfonyl fluoride (PFOSF)*.

For the PBDEs inventory development, the PBDEs/PFOS Inventory Group used the UNEP "Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants" (UNEP 2012) – hereinafter referred to as: PBDEs Guidance (UNEP 2012).

#### 2.3.3.1 Introduction

PBDEs are in the category of the so-called "new chemicals" of the Stockholm Convention. Namely, in 2009 the Conference of the Parties (COP) introduced amendments to the Stockholm Convention on POPs in order to add the following substances to Annexes A and B:

- Hexabromobiphenyl ("HBB")
- Two polybrominated diphenyl ethers ("PBDEs"):
  - Hexabromodiphenyl ether and ether heptabromodiphenyl
  - Tetrabromodiphenyl ether and ether pentabromodiphenyl

Similar to all POPs, the abovementioned substances pose a threat to human health and the environment, do not decompose in the environment and accumulate in organisms, just as pesticides and PCBs. Due to improper management of these substances in the industry and improper management of these substances when they are no longer used and become waste, these substances can accumulate in the tissues of migrating animals as a result of emissions and/or releases into the air and water. In this manner, the substances can be transferred across international borders and reach far away from the place of emission and/or discharge, and can re-accumulate in terrestrial and aquatic ecosystems.

Commercial PentaBDE (c-PentaBDE), homologues<sup>71</sup> tetraBDE and pentaBDE, as well as c-OctaBDE, hexaBDE and heptaBDE, are listed under the Stockholm Convention, specifically under Annex A of the Convention. The Contracting Parties of the Stockholm Convention, including BiH, are required to meet the obligations of the Convention, i.e. they are obliged to take actions to eliminate the use of these substances. Due to the complexity and scope of the use of PBDEs and PFOS and related substances, their elimination from use poses a challenge to many Parties to the Stockholm Convention.

The main objective of the inventory of PBDEs is obtaining the data needed for the carrying out the obligations under the Stockholm Convention in terms of developing the National Implementation Plan.

<sup>71</sup> A group of compounds whose adjacent members differ in one parameter.



Although the hexabromobiphenyl (HBB) was added to Annex B in 2009 as one of the substances whose use has to be limited, due to its low production and limited use, most materials containing HBB were disposed of decades ago (PBDEs Guidance, UNEP 2012) and therefore are not the subject of the inventory.

#### Early use of C-PentaBDE

According to the PBDEs Guidance (UNEP 2012), it is considered that 90% and 95% of c-PentaBDE was used for the treatment of polyurethane (PUR) foam. These foams were mainly used in automotive applications and upholstery. They were also used in the manufacture of textiles, foam insulation, cable sheaths, varnishes, conveyor belts and similar. The total amount of c-PentaBDE that was used in this case was 5% or less of the total usage for all purposes. It is estimated that about 15,000 tons of c-pentaBDE has been used in Europe.

##### *The reuse, recycling and waste of C-PentaBDE*

The main use of c-PentaBDE was in PUR foams in the transport sector (e.g. cars, buses, trains, etc.) and furniture (e.g. sofas, seats, seat covers, etc.), with limited use in mattresses and other uses. Other applications from earlier use, to a smaller extent (e.g. insulation in construction, treated rubber, textiles, PVC, etc.), are addressed in the inventory only if considered relevant in the country (PBDEs Guidance, UNEP 2012). In accordance with the PBDEs Guidance (UNEP 2012), the PBDEs/PFOS Inventory Group has focused on the inventory of the substances applied in the transport sector.

In industrialized countries, the lifetime of vehicles, the so-called lifespan of passenger cars, is 10 to 12 years, whereas buses and trains have a longer life expectancy. A significant share of cars and other vehicles is still exported from industrialized countries to developing countries and countries with economies in transition, where vehicles are often used for a longer period of time, after which spare parts can still be used. It is expected that a large proportion of vehicles produced in the period from 1970 to 2004 (cars, buses and trains perhaps) containing C-PentaBDE is still in use today, more likely in developing countries. Therefore, it is reasonable to assume that the transport sector (cars, trucks, buses, trains, ships and planes) represents the largest stocks of c-PentaBDE in developing countries (PBDEs Guidance, UNEP 2012), which includes Bosnia and Herzegovina as a developing country<sup>72</sup>.

#### Early use of C-OctaBDE

The main early use of c-OctaBDE was for the housings of electrical and electronic equipment (EEE), especially for CRT (cathode ray tubes) housing and office equipment such as copying machines and printers. While most of these polymers were used in electronics, they were also used in the transport sector to a smaller extent (PBDEs Guidance, UNEP 2012).

##### *The reuse, recycling and waste of C-OctaBDE*

Europe and Japan ceased production of c-OctaBDE in 1990 and the United States in 2004. The largest amount of c-OctaBDE was found in polymers (especially in ABS and HIPS) that are used in EEE and electrical and electronic waste (e-waste). The use of c-OctaBDE in the transport sector was limited (PBDEs Guidance, UNEP 2012).

Electronics manufactured before the year 2005 may have been treated with c-OctaBDE. The main devices in this category are television and computer monitors. In some cases, large amounts of old EEE and e-waste are still being exported from industrialized countries/regions (e.g., the United States, Europe and Japan) to developing countries for reuse or recycling. Primitive technologies of e-waste recycling have resulted in large contaminated areas and public exposure in developing countries (PBDEs Guidance, UNEP 2012).

### 2.3.3.2 Process of developing the PBDEs preliminary inventory

The methodology used by the PBDEs/PFOS Inventory Group for inventory of PBDEs was based on methodology developed by UNEP (PBDEs Guidance, UNEP 2012). In order to carry out the inventory of PBDEs, the PBDEs/PFOS Inventory Group used all the available data on imports, exports, trade and use of POPs in BiH, as well as the old stocks.

The preliminary inventory of PBDEs was carried out in the period from May to December 2013, and the process of developing the inventory is described in detail in Annex 6.

<sup>72</sup> <http://unstats.un.org/unsd/methods/m49/m49regin.htm#developed> (accessed November 2013)

### 2.3.3.3 Preliminary inventory of polybrominated retardants (POP-PBDEs) - Electrical and electronic equipment (EEE)

PBDEs are a group of industrial organobromine aromatic chemicals used since the 1970s, as additives - retardants in a wide range of consumer products. PBDEs were produced in three different degrees of bromination and sold under the names c-PentaBDE, c-OctaBDE and commercial DecaBDE (c-DecaBDE)<sup>73</sup>.

Information and Communications Technology - ICT has been a key factor in economic and social development of every country, and is currently in the process of improvement in the developed and the developing world.

There is still a significant difference in the approach to ICTs between developed and developing countries, which is commonly called the "digital divide". In the last few years, Bosnia and Herzegovina has been in the process of ICT transformation, trying to bridge that gap by importing new, second-hand or used computers, cell phones, TVs from developed countries (PBDEs Guidance, UNEP 2012). These appliances, along with other electrical and electronic equipment (EEE), also contribute to the large amount of electrical and electronic equipment waste (e-waste) once they become unusable, i.e. reach the end-of-life.

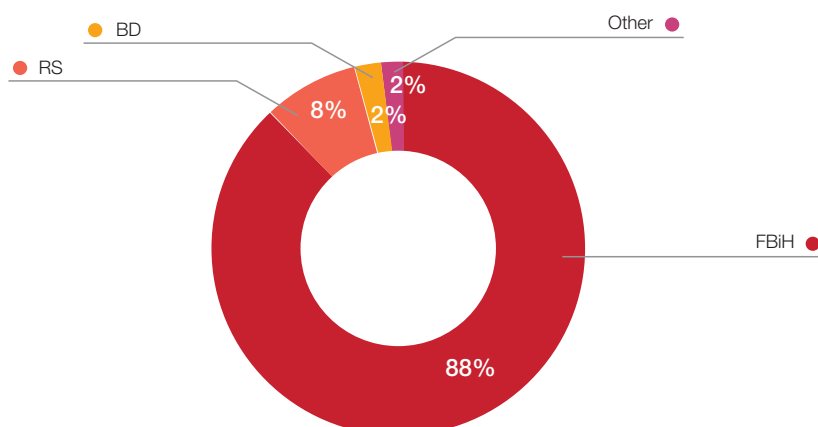
The *Regulation on Waste Electrical and Electronic Products* (Official Gazette of FBiH, no. 87/12) came into force in the Federation of BiH on 20 October 2012. With the adoption of the said Regulation, the Federation of BiH has joined the advanced European countries protecting the environment and preserving natural resources. The essence of this Regulation is the obligation of the manufacturers and the importers of electrical and electronic equipment to ensure proper disposal of EEE at the end of their lifespan.

The Federal Ministry of Environment and Tourism has appointed the company ZEOS eko-sistem d.o.o. as the authorized operator of the management system of waste electrical and electronic equipment on the territory of the Federation BiH. The system operator is the legal entity to which the producers and importers of EEE transfer the responsibility of management and disposal of waste EEE and which is engaged in the activities of waste equipment management and disposal. The founders of the company ZEOS eko-sistem d.o.o. are the most representative manufacturers and importers of EEE: ZEOS d.o.o., Gorenje Commerce d.o.o., Mercator BH d.o.o., General Servis d.o.o. Sarajevo, Tehno-mag d.o.o. Orašje and Ekosij d.o.o.

According to an analysis carried out by the company ZEOS eko-sistem d.o.o., over 4,100 companies in BiH import EEE. Approximately 87% of importing companies are seated in the Federation of BiH, and the same percentage belongs to equipment whose first placement on the market is in the Federation of BiH.

Figure 21 shows the market analysis based on the headquarters of the companies importing EEE in the Federation of BiH, Republika Srpska, Brčko District and others (international organizations, individuals, etc.)

**Figure 21:**  
Market analysis  
in BiH according  
to headquarters of  
importers of EEE



According to the Regulation on Waste Electrical and Electronic Products, EEE is categorized into ten (10) classes as shown below:

Class and subclass of electrical and electronic equipment
Class 1 - Large household appliances
Class 1a - Apparatus for cooling and freezing
Class 2 - Small home appliances
Class 3 - Equipment for IT and Telecommunications
Class 3a - Monitors
Class 4 - Equipment for entertainment electronics
Class 4a - Television receivers
Class 5 - Lighting equipment
Class 5a - Gas lamps
Class 6 - Electrical and electronic tools (except large stationary industrial tools)
Class 7 - Toys, leisure and sports equipment
Class 8 - Medical apparatus (except apparatus that can cause radiation or infection)
Class 9 - Instruments for Monitoring and Surveillance
Class 10 - Slot - machines

*Table 56:  
Classes of electrical and electronic equipment*

The table below presents the total amount imported and exported EEE in 2012 according to the Agency for Statistics of BiH.

Electrical and electronic equipment	Quantity (tonnes)
Imported EEE	69,386
Exported EEE	19,994

*Table 57:  
Total quantities of imported and exported EEE in 2012*

Calculations of the amount of c-OctaBDE in EEE are given in the following chapters. Research has shown that c-OctaBDE occurs mainly in relevant concentrations in enclosures of CRT televisions and computer monitors<sup>74</sup>. For the inventory of PBDEs in EEE/e-waste, priority is given to classes 3 and 4 with a special emphasis on CRT computer monitors and CRT television sets. The inventory of stocks and flows of EEE/e-waste is processed in three stages of the life cycle of EEE (as shown in the following chapters):

- Import of new and second-hand EEE;
- EEE stocks (EEE in use or stored);
- EEE which becomes waste.

#### POP-PBDEs in the imported EEE

The amount of PBDEs in the imported EEE is calculated in accordance with PBDEs Guidance (UNEP 2012). The data on the total amount of imported EEE, as well as the amounts per each class and subclass of EEE, were obtained from the Agency for Statistics for the last completed calendar year 2012. The data are given in summarized form for the entire country. Based on the obtained data, the total amount of c-OctaBDE in imported EEE has been determined as well (Table 62).

Table 58, Table 59, Table 60 and Table 61 present the calculations of the amounts of c-OctaBDE in EEE imported into BiH for classes 3 and 4, as shown below:

- $M_{c\text{-OctaBDE}; \text{imported EEE}(j)}$  amount of c-OctaBDE in imported used EEE(j) in [kg];
- $M_{\text{EEE}(j); \text{imported}}$  is amount of imported (new+ used) EEE(j) in one year in [metric tons];
- $f_{\text{EEE}(j); \text{used}}$  is share of used EEE (j) in imported in [weight -%];
- $f_{\text{polymer}}$  is the total fraction of polymer in EEE (j) in [weight -%];
- $C_{\text{OctaBDE}; \text{Polymer}}$  is c-OctaBDE content in the total fraction of polymer in EEE (j) in [kg/metric tons].

74 PBDEs Guidance (UNEP 2012)

**Table 58:**  
Total quantity c-OctaBDE in imported information technology (IT) equipment and telecommunications equipment excluding monitors in 2012

287.66	=	5798.24	x	0.525	x	0.42	x	0.225
$M_{c\text{-OctaBDE}; \text{imported EEO}}$	=	$M_{\text{EEO}} \text{ (imported)}$	x	$f_{\text{EEO}} \text{ (second-hand)}$	x	$f_{\text{polymer}}$	x	$C_{c\text{-OctaBDE}; \text{Polymer}}$

**Table 59:**  
Total quantity of c-OctaBDE in imported CRT computer monitors in 2012

6.27	=	15.672	x	0.525	x	0.3	x	2.54
$M_{c\text{-OctaBDE}; \text{imported EEO}}$	=	$M_{\text{EEO}} \text{ (imported)}$	x	$f_{\text{EEO}} \text{ (second-hand)}$	x	$f_{\text{polymer}}$	x	$C_{c\text{-OctaBDE}; \text{Polymer}}$

**Table 60:**  
Total quantity of c-OctaBDE in imported consumer equipment excluding monitors in 2012

63.41	=	3355.14	x	0.525	x	0.24	x	0.15
$M_{c\text{-OctaBDE}; \text{imported EEO}}$	=	$M_{\text{EEO}} \text{ (imported)}$	x	$f_{\text{EEO}} \text{ (second-hand)}$	x	$f_{\text{polymer}}$	x	$C_{c\text{-OctaBDE}; \text{Polymer}}$

**Table 61:**  
Total quantity of c-OctaBDE in imported CRT monitors in 2012

23.68	=	172.793	x	0.525	x	0.3	x	0.87
$M_{c\text{-OctaBDE}; \text{imported EEO}}$	=	$M_{\text{EEO}} \text{ (imported)}$	x	$f_{\text{EEO}} \text{ (second-hand)}$	x	$f_{\text{polymer}}$	x	$C_{c\text{-OctaBDE}; \text{Polymer}}$

**Table 62:**  
Summary of total quantity of c-OctaBDE in imported classes 3 and 4 of EEE in 2012

Class	Total quantity of c-OctaBDE in imported EEE	Total quantity (kg)
3	Information technology (IT) equipment and telecommunications equipment excluding monitors	287.66
3a	CRT computer monitors	6.27
4	Consumer equipment without monitors	63.41
4a	CRT monitors	23.68
Total quantity of c-OctaBDE in imported EEE		381.02

### PBDEs in EEE in use or stored at the consumer's (user's) level (stockpiled)

Unlike the imported EEE, it is not possible to categorize the EEE stocks into old (second-hand) and new EEE, and therefore the amount of PBDEs was estimated by taking into account the full scope of EEE in stock.

Quantities of EEE in stocks represent EEE in use or stored at the consumer's (user's) level, i.e. the level of households and institutional users, and are obtained on the basis of the total amount of installed EEE in households in BiH (Table 71), total amount of installed EEE in BiH in industrial and service sectors (Table 74), and household surveys and questionnaires submitted by corporate and institutional customers. An overview of the total amount of c-OctaBDE in stock for 2013 in BiH is shown in Table 79.

The PBDEs/PFOS Inventory Group calculated the amount of c-OctaBDE in accordance with PBDEs Guidance (UNEP 2012).

#### Consumers - users of EEE

Consumers are the public and every organization that uses EEE, discards or stores them as waste when they reach the end of their lifespan. In this inventory, three types of consumers are examined:

- Private consumers (households);
- Institutional consumers (public institutions, the government, health and educational sector);
- Corporate customers (large companies (industries) and small business entities).

#### a) Households

The household survey is based on analysis of household participation in the labour market, which was performed by the Agency for Statistics of Bosnia and Herzegovina, on the basis of information on households i.e. heads of households.

The characteristics of the head of the household, in terms of employment, are the ones that mainly affect the purchasing power of households, the consumption expenditure levels, and thus the living standards of household members. Therefore the characteristics of the head of the household can be regarded as a substitute for the socioeconomic characteristics of the entire household (Agency for Statistics of BiH: Household Budget Survey in BiH 2011, Sarajevo, 2013).

The average household size in BiH is 3.07 members; the average number of persons in the labour force is 1.27.

On average, every household in BiH has one employed member (0.89). The total number of households in BiH amounts to 1,033,452, out of which the total number of households with members in the labour force is 732,685, whereas those not in the labour force amount to 300,767.

Income	Share of households
Up to 350 BAM	2.6%
351 – 500 BAM	26.8%
501 – 650 BAM	13.1%
651 – 800 BAM	12.5%
801 – 950 BAM	13.2%
951 – 1100 BAM	10.5%
1101 – 1400 BAM	9.9%
1401 – 1700 BAM	4.8%
1701 – 2000 BAM	3%
2001 – 2500 BAM	2.4%
2501+ BAM	1.2%

*Table 63:  
Distribution of  
households by income*

The interviews for the household survey were carried out in a total of 300 households, distributed in rural and urban areas throughout BiH (FBiH, RS and BD) (Table 65) with different categories of income (Table 64), in accordance with national statistics in November 2013.

Height of net salary	Number of interviews in BiH	%	Number of interviews in FBiH	%	Number of interviews in RS	%	Number of interviews in BD	%
No income	19	6.3%	11	6.1%	8	6.9%	0	0.0%
Up to 350 BAM	99	33.0%	56	30.9%	42	36.2%	1	33.3%
351 – 500 BAM	63	21.0%	40	22.1%	22	19.0%	1	33.3%
501 – 650 BAM	42	14.0%	25	13.8%	16	13.8%	1	33.3%
651 – 800 BAM	21	7.0%	16	8.8%	5	4.3%	0	0.0%
951 – 1100 BAM	24	8.0%	9	5.0%	15	12.9%	0	0.0%
1101 – 1400 BAM	17	5.7%	13	7.2%	4	3.4%	0	0.0%
801 – 950 BAM	3	1.0%	2	1.1%	1	0.9%	0	0.0%
1401 – 1700 BAM	7	2.3%	5	2.8%	2	1.7%	0	0.0%
1701 – 2000 BAM	1	0.3%	1	0.6%	0	0.0%	0	0.0%
2001 – 2500 BAM	3	1.0%	2	1.1%	1	0.9%	0	0.0%
2501+ BAM	1	0.3%	1	0.6%	0	0.0%	0	0.0%
<b>Total</b>	<b>300</b>	<b>100.0%</b>	<b>181</b>	<b>100.0%</b>	<b>116</b>	<b>100.0%</b>	<b>3</b>	<b>100.0%</b>

*Table 64:  
Number of interviews in  
households according to  
height of net salary*

Area	Number of interviews in BiH	%	Number of interviews in FBiH	%	Number of interviews in RS	%	Number of interviews in BD	%
Urban	156	52.0	95	52.5	59	50.9	2	66.7
Rural	144	48.0	86	47.5	57	49.1	1	33.3
<b>Total</b>	<b>300</b>	<b>100.0</b>	<b>181</b>	<b>100.0</b>	<b>116</b>	<b>100.0</b>	<b>3</b>	<b>100.0</b>

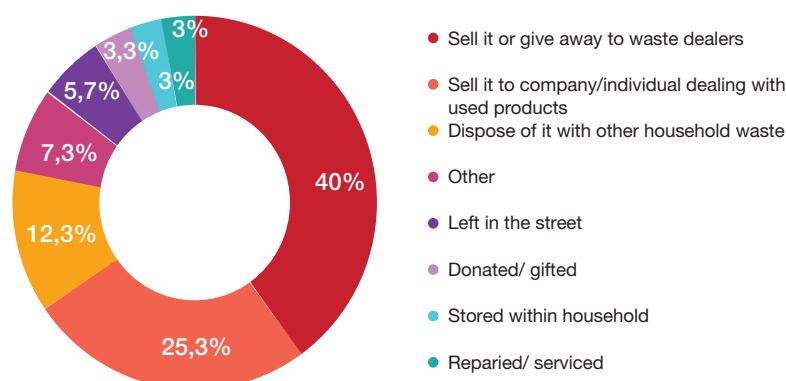
*Table 65:  
Number of interviews in  
households by area  
(urban / rural)*

#### *Level of awareness and e-waste disposal practices*

According to household survey results, 89% of households reported that they are aware of the danger of disposal of e-waste, whereas about 5% of them are not aware of the environmental hazards caused by discarded EEE.

The disposal practices of individual leading devices of class 1-4 EEE were evaluated as well (Figure 22). It was established that 40% of devices that are no longer used in households are sold or handed to waste traders. About 25% of EEE is sold to companies or persons dealing with the trade of second-hand devices, which indicates that they are intended for serving as functional devices to other consumers.

Figure 22:  
E-waste disposal  
practices by households



### Installed EEE

The average amount of installed devices in Bosnia and Herzegovina has been estimated based on the household survey (Table 66). The results show that the average amount of installed devices from class 1-4 in households is approximately 23.2 devices, which is equivalent to the weight of about 315.54 kg.

In order to extrapolate the household survey results to the entire BiH, the values shown in Table were used along with statistical data for the distribution of households by revenue (Table 63), and the number of households. The number of units (devices) is converted to tons by using the average weight of devices according to Olakitan Ogungbuyi et al., 2012. Table 70 shows the results for the leading devices EEE, and Table 71 shows the results for the total amount of installed EEE in households in BiH from class 1 - 4.

Table 66:  
Average amount of  
equipment from classes  
1-4 in households in  
Bosnia and Herzegovina

Large household appliances (Class 1)		
Product	Average amount of equipment per household	
	(number)	(kg)
Refrigerator	1.1	37.69
Air conditioner	0.1	1.81
Washing machine	1.0	65.75
Freezer	0.6	33.6
Tumble dryers	0.1	5.75
Electric heaters	0.3	1.52
Dish washer	0.2	9.73
Electric Grill	0.1	1.33
Electric / gas stove	0.8	43.6
Oven	0.8	44.52
Hot plate	0.3	n/a
<b>Total Class 1</b>	<b>5.5</b>	<b>245.3</b>

Small household appliances (Class 2)		
Product	Average amount of equipment per household	
	(number)	(kg)
Iron	1.0	1.0
Electric kettle	0.3	0.3
Blender	0.1	0.21
Microwave oven	0.4	5.94
Hairdryer	1.0	1.0
Mixer	0.9	0.9
Fan	0.1	1.0
Vacuum cleaner	1.0	8.5
Carpet cleaning device	0.0	0.0
Toaster	0.2	1.0
Cables	3.8	na
Junction box	1.2	na
Blowtorch	0.0	0.0
Electric lawnmower	0.1	1.4
Electric alarm clock	0.1	0.03
<b>Total Class 2</b>	<b>10.4</b>	<b>21.28</b>

IT and telecommunications equipment (Class 3)		
Product	Average amount of equipment per household	
	(number)	(kg)
Computer	0.4	4.24
CRT <sup>76</sup> monitor	0.2	3
LCD <sup>77</sup> monitor	0.2	0.9
Laptop	0.2	0.66
Mobile telephone	2.0	1.02
Telephone	1.0	1
Printer	0.1	0.7
Copier	0.0	0.0
Scanner	0.0	0.0
Fax machine	0.0	0.0
Modem	0.4	0.1
<b>Total Class 3</b>	<b>4.5</b>	<b>11.62</b>

Consumer equipment (Class 4)		
Product	Average amount of equipment per household	
	(number)	(kg)
Television (CRT)	0.8	25.86
Television (flat screen)	0.5	7.5
Radio	0.8	1.65
Stereo	0.1	1.01
DVD player	0.2	0.98
VCR player	0.0	0.0
MP3 player	0.1	0.21
Camera/photo camera	0.2	0.13
Game consoles	0.0	0.0
<b>Total Class 4</b>	<b>2.8</b>	<b>37.34</b>

75 Olakitan Ogungbuyi et al.: e-Waste Country Assessment Nigeria, 2012.

76 CRT cathode ray tube

77 LCD liquid-crystal display

Installed devices per household according to different income categories												
Major devices	No income	Up to 350 BAM	351 – 500 BAM	501 – 650 BAM	651 – 800 BAM	801 – 950 BAM	951 – 1100 BAM	1101 – 1400 BAM	1401 – 1700 BAM	1701 – 2000 BAM	2001 – 2500 BAM	2501+ BAM
Fridge	1.1	1.0	1.0	1.0	1.0	1.1	1.4	1.0	1.3	1.0	1.7	2.0
Air conditioner	0.0	0.1	0.1	0.0	0.1	0.1	0.2	0.0	0.0	1.0	0.3	0.0
Iron	0.9	1.0	1.0	1.0	1.0	1.0	1.1	1.0	1.0	0.0	1.0	1.0
Kettle	0.3	0.2	0.3	0.3	0.3	0.4	0.5	0.0	0.7	1.0	0.3	0.0
Computer	0.4	0.2	0.4	0.5	0.7	0.5	0.7	0.7	0.9	0.0	0.3	2.0
Laptop	0.2	0.1	0.2	0.1	0.1	0.3	0.8	0.7	0.6	0.0	0.7	2.0
Mobile phone	2.6	1.5	1.5	2.1	2.8	2.8	3.1	3.3	2.7	0.0	3.0	9.0
Television (CRT)	0.9	0.8	0.9	0.7	1.0	0.8	1.1	0.3	0.7	1.0	0.3	5.0
Television (flat screen)	0.4	0.4	0.3	0.5	0.6	0.6	1.0	1.0	0.7	2.0	0.7	0.0
Radio	0.7	0.9	0.8	0.8	0.8	0.7	0.9	1.0	0.7	1.0	0.7	0.0
Stereo	0.1	0.0	0.1	0.1	0.1	0.1	0.1	0.0	0.3	1.0	0.0	0.0

**Table 67:**  
Average amount of major devices installed in households in BiH according to different income categories

Installed devices per household according to different income categories												
Major devices	No income	Up to 350 BAM	351 – 500 BAM	501 – 650 BAM	651 – 800 BAM	801 – 950 BAM	951 – 1100 BAM	1101 – 1400 BAM	1401 – 1700 BAM	1701 – 2000 BAM	2001 – 2500 BAM	2501+ BAM
Fridge	1.0	1.0	1.1	1.1	1.0	1.2	1.4	1.0	1.3	1.0	1.0	-
Air conditioner	0.0	0.1	0.1	0.1	0.1	0.1	0.2	0.0	0.0	1.0	0.0	-
Iron	0.9	0.98	1.0	1.1	1.0	1.0	1.1	1.0	1.0	0.0	1.0	-
Kettle	0.4	0.3	0.3	0.2	0.3	0.7	0.4	0.0	0.8	1.0	0.0	-
Computer	0.4	0.2	0.4	0.4	0.7	0.6	0.6	0.7	1.0	0.0	0.5	-
Laptop	0.3	0.1	0.2	0.1	0.2	0.5	0.8	0.7	0.5	0.0	0.5	-
Mobile phone	2.5	1.4	1.5	1.7	2.8	3.1	2.8	3.3	2.5	0.0	3.0	-
Television (CRT)	0.9	0.7	0.8	0.9	1.0	0.7	1.0	0.3	0.5	1.0	0.5	-
Television (flat screen)	0.3	0.5	0.5	0.6	0.4	0.9	1.0	1.0	1.0	2.0	0.5	-
Radio	0.8	0.9	0.8	0.9	0.8	0.6	1.0	1.0	0.8	1.0	0.5	-
Stereo	0.0	0.1	0.1	0.1	0.1	0.1	0.1	0.0	0.5	1.0	0.0	-

**Table 68:**  
Average amount of major devices installed in households in urban areas of BiH according to different income categories

Installed devices per household according to different income categories												
Major devices	No income	Up to 350 BAM	351 – 500 BAM	501 – 650 BAM	651 – 800 BAM	801 – 950 BAM	951 – 1100 BAM	1101 – 1400 BAM	1401 – 1700 BAM	1701 – 2000 BAM	2001 – 2500 BAM	2501+ BAM
Fridge	1.2	1.0	1.0	1.0	1.1	1.0	1.3	-	1.3	-	3.0	2.0
Air conditioner	0.0	0.0	0.0	0.0	0.2	0.1	0.5	-	0.0	-	1.0	0.0
Iron	0.9	1.0	1.0	1.0	1.1	1.0	1.3	-	1.0	-	1.0	1.0
Kettle	0.3	0.2	0.2	0.3	0.3	0.2	0.8	-	0.7	-	1.0	0.0
Computer	0.4	0.2	0.4	0.5	0.7	0.5	1.0	-	0.7	-	0.0	2.0
Laptop	0.1	0.1	0.2	0.1	0.1	0.2	0.8	-	0.7	-	1.0	2.0
Mobile phone	2.6	1.6	1.6	2.5	2.8	2.6	3.8	-	3.0	-	3.0	9.0
Television (CRT)	0.9	0.8	1.1	0.6	0.9	0.9	1.3	-	1.0	-	0.0	5.0
Television (flat screen)	0.5	0.2	0.2	0.5	0.8	0.3	1.0	-	0.3	-	1.0	0.0
Radio	0.7	0.9	0.8	0.8	0.8	0.8	0.8	-	0.7	-	1.0	0.0
Stereo	0.1	0.0	0.1	0.0	0.2	0.1	0.3	-	0.0	-	0.0	0.0

**Table 69:**  
Average amount of major devices installed in households in rural areas of BiH according to different income categories

**Table 70:**  
Installed major EEE  
in BiH

Device	Per household	Total quantity (unit (of device))	Total quantity per capita (per 1000 inhabitants)	Total quantity (tonnes)
Fridge	1.099	1,607,445	424	55,087
Air conditioner	0.057	119,487.7	32	2,158
Iron	0.940	1,400,079	369	1,400
Kettle	0.319	478,996.8	126	479
Computer	0.474	741,241.1	195	7,857
Laptop	0.272	444,443.5	117	1,480
Mobile phone	2.499	3,585,857	946	1,829
Television (CRT)	0.880	1,273,314	336	41,166
Television (flat screen)	0.512	821,708.1	217	12,326
Radio	0.754	1,137,767	300	2,355
Stereo	0.110	167,751	44	1,698

**Table 71:**  
Total quantity of installed  
EEE in households in  
BiH

Class	Leading device (tonnes)	Total according to Classes 1-4 (tonnes)	Share
Class 1	57,245	373,919	76.6%
Class 2	1,879	32,409	6.6%
Class 3	11,166	21,651	4.4%
Class 4	57,545	59,979	12.4%
Class	127,835	487,958	100%
	26.2%	100%	

#### b) Corporate and institutional users of EEE in Bosnia and Herzegovina

In this research carried out by the PBDEs/PFOS Inventory Group by sending questionnaires to corporate and institutional customers in BiH in the period June - October 2013, it was assumed that the corporate and institutional customers correspond to the sectors of industry and services (Table 72), whereas the agricultural sector was not covered as it can be regarded as a private consumer (given the small prevalence of relevant classes 3 and 4 of EEE based on the expert assessment of the PBDEs/PFOS Inventory Group). A total of 33 questionnaires were answered - 5 in the industrial sector, 28 in the service sector, out of which 8 were corporate customers and 20 institutional consumers.

**Table 72:**  
Economic sectors in  
BiH related to labour,  
consumer type, type of  
business and number of  
answered questionnaires

Sector	Labour force - by occupation (CIA 2008. and 2010.)		Consumer type	Type of business	Number of answered questionnaires
	%	(Labour force)			
Agriculture	20.5%	533,000	Corporate	-	-
Industry	32.6%	847,600	Corporate	Production	5
Services	47%	1,222,000	Corporate	Finance ICT	3 5
			Institutional	Education Healthcare Government / Ministries / Municipalities	1 3 16
Total	100%	2,600,000			33

#### Level of awareness and e-waste disposal practices

100% of the corporate and institutional of consumers stated that they are aware of the environmental hazards caused by discarded EEE, and 95% of them know that the dangerous parts of EEE require certain special treatment in order to be safely disposed of/discharged as waste. However, despite being aware of the dangers mentioned, 82.5% of respondents reported that their organization has no rulebook or strategy for the management of e-waste.

Figure 23 presents the e-waste disposal practices by corporate and institutional customers. Most of the corporate and institutional customers dispose of e-waste along with all other waste (21%), donate it (20%) or hand it over to a company that collects e-waste (16%).



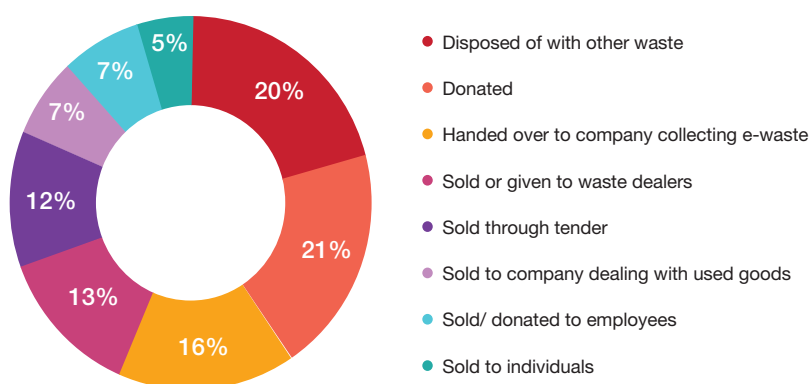


Figure 23: E-waste disposal practices by corporate and institutional customers

Installed EEE

The research conducted by the PBDEs/PFOS Inventory Group on the amount of EEE of corporate and institutional consumers in the period June - October 2013 showed that the majority of corporate and institutional customers purchase EEE through authorized distributors or retail stores. Purchase of second-hand equipment was not mentioned in the responses to the questionnaire, and therefore it can be assumed that all purchased EEE was new.

The rate of the number of devices per employee, expressed in percentages for six leading products in corporate and institutional organizations, is presented in Table 73. The results show that the most commonly installed EEE belongs to the third class (IT equipment) with the average rate of about 80% at the corporate level and about 60% at the institutional level, followed by air conditioners (class 1), wherein the difference between corporate and institutional customers is not as large and is approximately 3% and 5%, respectively. Results also show that for each 25<sup>th</sup> employee one refrigerator is installed. It is assumed that the equipment from class 2 is not relevant for corporate and institutional customers, considering that the kettle is probably the only device used. The equipment from the fourth class (CRT TV and radio) can be found, but also to a smaller extent.

	Fridge	Air conditioner	Kettle	Computer	CRT TV	Radio
Corporate organization	3.36%	25.39%	1.56%	77.24%	3.14%	0.12%
Production	4.21%	15.87%	0.55%	34.49%	1.64%	0.20%
Finance	0.84%	20.70%	0.13%	106.80%	0.75%	0.08%
ICT	5.03%	39.61%	4%	90.42%	0.75%	0.08%
Institutional organization	5.22%	13.38%	5.59%	56.76%	1.91%	1.20%
Education	7.81%	31.25%	15.62%	70.31%	1.56%	0
Healthcare	6.12%	2.42%	1.08%	16.34%	3.51%	3.24%
Government / Ministries / Municipalities	1.74%	6.47%	0.09%	83.64%	0.68%	0.38%
Total	4.29%	19.38%	3.57%	67%	2.52%	0.66%

Table 73: The rate of number of devices per employee (%) for the six leading products according to surveys in corporate and institutional organizations

The total amount of leading products can be calculated by applying the rates of the workforce. In order to extrapolate the amount of the leading products to the total amount of EEE, the following assumptions were made: i) among the devices from class 1, 2 and 4, only the leading products (refrigerators, air conditioners, electric kettles, CRT TV and radio) are relevant to corporate and institutional customers; ii) for the devices from class 3 it is assumed that additional devices of 13.8 kg are installed per computer (the average weight of a mix of desktop computers, CRT monitors, LCD monitors and laptops is 13.5 kg). The second assumption is based on the responses from the questionnaire. Specifically, it is assumed that mobile phones, which are used for business purposes, in fact fall within the devices installed by private consumers.

Table 74 presents the results. In addition to what has already been shown, it can be noted that the IT and communication equipment is the most relevant class (weight percentage is about 74), followed by refrigerators and air conditioners (weight percentage is about 23) and, to a much lesser extent, CRT TV and radio (weight percentage is about 3). The equipment from class 2 is not relevant to corporate and institutional users.

**Table 74:**  
Total quantity of installed EEE  
in BiH in industrial and service  
sector

	Industrial sector (tonnes)	Service sector (tonnes)	Total (tonnes)	Share
Class 1	3,650	6,250	9,900	22.67%
Class 2	5	11	16	0.03%
Class 3	7,980	24,520	32,500	74.42%
Class 4	455	800	1,255	2.88%
<b>Total</b>	<b>12,090</b>	<b>31,581</b>	<b>43,671</b>	<b>100.00%</b>
	27.69%	72.31%	100.00%	

Table 75, Table 76, Table 77 and Table 78 show the results of the inventory of PBDEs in EEE in use or stored, at the consumer's (user's) level (stock), calculated by the PBDEs/PFOS Inventory Group with the help of the formulas given in the PBDEs Guidance (UNEP 2012) for classes 3 and 4, as shown below:

- $M_{c\text{-OctaBDE};\text{EEE in stock}(j)}$  amount of c-OctaBDE in EEE(j) in stock in [kg];
- $M_{\text{EEE}(j);\text{stock}}$  amount of EEE(j) in stock in [metric tons];
- $f_{\text{Polymer}}$  total fraction of polymer in EEE(j) in weight -%];
- $C_{\text{OctaBDE};\text{Polymer}}$  c-OctaBDE content in total fraction of polymer EEE(j) in [kg/ metric tons].

The PBDEs/PFOS Inventory Group made the calculation based on data on consumer habits related to EEE, in the three categories of consumers relevant to the inventory:

- Private consumers (households);
- Institutional consumers (public institutions, the government, health and educational sector);
- Corporate customers (large companies (industries) and small business entities).

**Table 75:**  
Quantity of c-OctaBDE in  
stockpiles in information  
technology (IT) equipment and  
telecommunications equipment  
excluding monitors

<b>4,506.04</b>	=	47,683	x	0.42	x	0.225
$M_{c\text{-Octa-BDE};\text{EEO stockpiled}(j)}$	=	$M_{\text{EEE}(j);\text{stockpiled}}$	x	$f_{\text{polymer}}$	x	$C_{c\text{-OctaBDE};\text{Polymer}}$

**Table 76:**  
Quantity of c-OctaBDE in  
stockpiles in CRT computer  
monitors

<b>4,928.61</b>	=	6,468	x	0.3	x	2.54
$M_{c\text{-Octa-BDE};\text{EEO stockpiled}(j)}$	=	$M_{\text{EEE}(j);\text{stockpiled}}$	x	$f_{\text{polymer}}$	x	$C_{c\text{-OctaBDE};\text{Polymer}}$

**Table 77:**  
Quantity of c-OctaBDE in  
stockpiles in consumer equipment  
without monitors

<b>685.65</b>	=	19,046	x	0.24	x	0.15
$M_{c\text{-Octa-BDE};\text{EEO stockpiled}(j)}$	=	$M_{\text{EEE}(j);\text{stockpiled}}$	x	$f_{\text{polymer}}$	x	$C_{c\text{-OctaBDE};\text{Polymer}}$

**Table 78:**  
Quantity of c-OctaBDE in  
stockpiles in CRT monitors

<b>11,011.06</b>	=	42,188	x	0.3	x	0.87
$M_{c\text{-Octa-BDE};\text{EEO stockpiled}(j)}$	=	$M_{\text{EEE}(j);\text{stockpiled}}$	x	$f_{\text{polymer}}$	x	$C_{c\text{-OctaBDE};\text{Polymer}}$

An overview of the total amount of c-OctaBDE in stock in BiH in 2013 is shown in Table 79.

**Table 79:**  
Summary of total quantity of  
c-OctaBDE in stockpiled classes  
3 and 4 of EEE in 2013

Class	Total quantity of c-OctaBDE in stockpiles	Total quantity (kg)
3	Information technology (IT) equipment and telecommunications equipment excluding monitors	4,506.04
3a	CRT computer monitors	4,928.61
4	Consumer equipment without monitors	685.65
4a	CRT monitors	11,011.06
<b>Total quantity of c-OctaBDE in stockpiled EEE</b>		<b>21,131.36</b>

### Calculation of PBDEs in waste

The two main data for the calculation were: (i) the amount of EEE (j) in the consumer's stock and (ii) the average lifespan (total hours of use and storing by the consumer).

The average life expectancy of the equipment from different classes of EEE for all consumers (Table 80) is based on the analysis of household surveys and the questionnaires submitted by corporate and institutional organizations.

Households and corporate and institutional consumers in BiH generate a total amount of 92,592 tons of e-waste, which amounts to about 24.4 tonnes per capita per year.

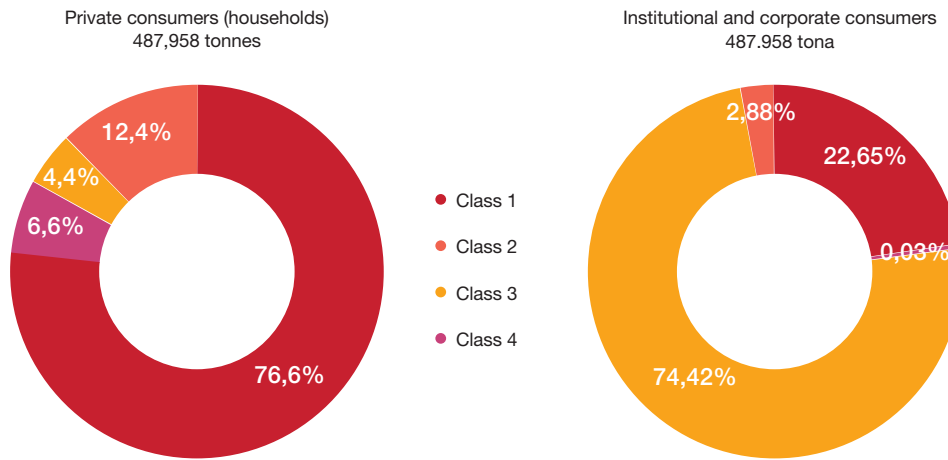


Figure 24: Weight distribution of installed EEE per class for households and corporate and institutional consumers in BiH

Class	Installed EEE			Life cycle (years)	Generated e-waste		
	Households (tonnes)	Corporate and institutional users (tonnes)	Total (tonnes)		E-waste (tonnes)	E-waste (tonnes /per capita)	Share (%)
1	373,919	9,900	383,819	6.5	59,049	15.6	63.9%
2	32,409	16	32,425	3.5	9,264	2.4	9.8%
3	21,651	32,500	54,151	4.5	12,034	3.2	13.1%
4	59,979	1,255	61,234	5	12,245	3.2	13.2%
<b>Total</b>	<b>487,958</b>	<b>43,671</b>	<b>531,629</b>		<b>92,592</b>	<b>24.4</b>	<b>100%</b>

Table 80: Overview of installed EEE and generated e-waste in BiH in 2013

Based on the amount of EEE in stocks of the consumer (user) and its average lifetime expectancy given in Table 80, as well as the households surveys and the questionnaires submitted by the corporate and institutional users, the amounts of generated e-waste and c-OctaBDE were calculated (Table 81, Table 82, Table 83 and Table 84) for the classes 3 and 4, as shown below:

- $M_{c-OctaBDE;e-waste(j)}$  amount of c-OctaBDE in e-waste in [kg];
- $M_{e-waste(j)}$  amount of e-waste in one year in [tons];
- $f_{polymer}$  total fraction of polymer in EEE(j) in weight -%];
- $C_{c-OctaBDE; Polymer}$  c-OctaBDE content in total fraction of polymer EEE(j) in [kg/ metric tons].

1,001.32	=	10,596	x	0.42	x	0.225
$M_{c-OctaBDE;e-waste(j)}$	=	$M_{e-waste(j)}$	x	$f_{polymer}$	x	$C_{c-OctaBDE; Polymer}$

Table 81: Quantity of c-OctaBDE in e-waste in information technology (IT) equipment and telecommunications equipment excluding monitors in 2013

986.03	=	1,294	x	0.3	x	2.54
$M_{c-OctaBDE;e-waste(j)}$	=	$M_{e-waste(j)}$	x	$f_{polymer}$	x	$C_{c-OctaBDE; Polymer}$

Table 82: Quantity of c-OctaBDE in e-waste in CRT computer monitors in 2013

171.43	=	4,762	x	0.24	x	0.15
$M_{c-OctaBDE;e-waste(j)}$	=	$M_{e-waste(j)}$	x	$f_{polymer}$	x	$C_{c-OctaBDE; Polymer}$

Table 83: Quantity of c-OctaBDE in e-waste in consumer equipment without monitors in 2013

1,693.89	=	6,490	x	0.3	x	0.87
$M_{c-OctaBDE;e-waste(j)}$	=	$M_{e-waste(j)}$	x	$f_{polymer}$	x	$C_{c-OctaBDE; Polymer}$

Table 84: Quantity of c-OctaBDE in e-waste in CRT monitors in 2013

Table 85 provides an overview of the total amounts of c-OctaBDE in e-waste in 2013 in BiH.

**Table 85:**  
Summary of total quantity of c-OctaBDE in e-waste classes 3 and 4 of EEE in 2013 in BiH

Class	Total quantity of c-OctaBDE in e-waste equipment	Total quantity (kg)
3	Information technology (IT) equipment and telecommunications equipment excluding monitors	1,001.32
3a	CRT computer monitors	986.03
4	Consumer equipment without monitors	171.43
4a	CRT monitors	1,693.89
Total quantity of c-OctaBDE in e-waste EEE		3,852.67

### Calculation of PBDEs in EEE

For the purposes of the final inventory development and reporting to the Secretariat of the Stockholm Convention, substances listed under Annex A of the Stockholm Convention, hexaBDE and heptaBDE must be calculated (by converting from a known amount of c-OctaBDE) and reported, in accordance with the PBDEs Guidance (UNEP 2012) (Table 86). The percentage of heptaBDE homologues is approximately 43% and hexaBDE homologues approximately 11% of the total c-OctaBDE.

**Table 86:**  
Calculation of PBDEs present in EEE according to PBDEs homologues (hexaBDE, heptaBDE and octaBDE)

Homologues	Distribution of c-OctaBDE homologues	PBDEs in imported EEE in 2012 (kg)	PBDEs in stockpiles in 2013 (kg)	PBDEs entering the waste chain in 2013 (kg)
c-OctaBDE		Σ c-OctaBDE 381.02	Σ c-OctaBDE 21,131.36	Σ c-OctaBDE 3,852.67
HexaBDE	11%	41.91	2,324.45	423.79
HeptaBDE	43%	163.84	9,086.48	1,656.65

### 2.3.3.4 Preliminary inventory of polybrominated retardants (POP-PBDEs) - Transport sector

According to PBDEs Guidance (UNEP 2012), c-PentaBDE is used in the transport sector; it is mainly used for the treatment of PUR foam (car seats, headrests, car ceilings, etc.), and to a smaller extent in textile coating of car seats. C-OctaBDE is also used in plastic car parts (steering wheels, dashboards, door panels, etc.). Cars and other vehicles (trucks and buses) are part of the transport sector, which contains the most significant amounts of PBDEs compared to other vehicles such as aircraft, which does not represent a significant source of PBDEs in BiH<sup>78</sup>. The inventory development methodology was, therefore, focused on these vehicles.

Considering that PBDEs were produced and used during the period 1975-2004, according to the UNEP Guidance for the inventory of polybrominated diphenyl ethers (PBDEs), only the cars produced in this period were the subject of the inventory.

#### Calculation of PBDEs in vehicles that are currently in use

In accordance with the PBDEs Guidance (UNEP 2012), only c-PentaBDE is treated as PBDE, whereas the amount of c-OctaBDE is very small and therefore can be neglected.

Table 87 shows the total amount of c-PentaBDEs in vehicles (cars, buses, trucks) that are currently in use in BiH, according to the Agency for Identification Documents, Registers and Data Exchange of BiH from June 2013.

According to the data the PBDEs/PFOS Inventory Work Group received from the Agency for Identification Documents, Registers and Data Exchange BiH on the manufacturing countries for motor vehicles registered in the period 1975 – 2004, the regional factor of 0.05 was adopted.

The regional factor refers to the number of vehicles treated with substances that contain PBDEs. In accordance with the PBDEs Guidance (UNEP 2012), it is assumed that in Europe 5% of the total number of vehicles produced in the period 1975-2004 were treated with substances that contain PBDEs.

<sup>78</sup> BiH national airline owns two airplanes in its fleet.

Number of cars/ trucks in use (produced before 2005)	Average quantity of c-pentaBDEs per car	Total quantity of c-pentaBDEs in cars in use						
		50,997	160 g per car (0.16 kg)	50,997	x	0.16	x	0.05
		Number of cars and trucks	X	Average quantity of c-penta BDEs per car/truck	X	Regional factor*	=	kg
Number of buses in use (produced before 2005)	Average quantity of c-pentaBDEs per bus	Total quantity of c-pentaBDEs in buses in use						
		172	x	1	x	0.05	=	8.60
172	1000 g per bus (1 kg)	Number of buses	X	Average quantity of c-penta BDEs per bus	X	Regional factor*	=	kg
TOTAL QUANTITY OF c-pentaBDEs		Sum of c-pentaBDEs				416.58 kg		

**Table 87:**  
Total quantity of  
c-pentaBDEs in vehicles  
in use in BiH

\* Evaluation factor for c-pentaBDEs treated vehicles according to production region (in the period 1975-2004)

### Calculation of PBDEs in imported/exported vehicles

Table 88 shows the total amount of c-PentaBDEs in imported vehicles (cars, buses, trucks) that are currently in use in BiH, according to data the PBDEs/PFOS Inventory Work Group received from the Agency for Statistics of BiH on the number of imported vehicles for year 2012.

Number of imported cars/ trucks in use (produced before 2005)	Average quantity of c-pentaBDEs per car	Total quantity of c-pentaBDEs in cars in use						
		100,198,170	160 g per car (0.16 kg)	100,198,170	x	0.16	x	0.05
		Number of cars and trucks	X	Average quantity of c-penta BDEs per car/truck	X	Regional factor *	=	kg
Number of buses in use (produced before 2005)	Average quantity of c-pentaBDEs per bus	Total quantity of c-pentaBDEs in buses in use						
		2,253,103	x	1	x	0.05	=	112,655.15
2,253,103	1000 g per bus (1 kg)	Number of buses	X	Average quantity of c-penta BDEs per bus	X	Regional factor *	=	kg
TOTAL QUANTITY OF c-pentaBDEs		Sum of c-pentaBDEs				914,240.51 kg		

**Table 88:**  
Total quantity of  
c-pentaBDEs in imported  
vehicles in BiH

\* Evaluation factor for c-pentaBDEs treated vehicles according to production region (in the period 1975-2004)

### Calculation of PBDEs in end-of-life vehicles

According to the data obtained by the PBDEs/PFOS Inventory Work Group, the Agency for Identification Documents, Registers and Data Exchange BiH, the entity and BD level ministries of internal affairs, the cantonal ministries of internal affairs in FBiH and the Public Security Centre of RS do not keep records of vehicles that have reached their end-of-life (ELV).

Data provided by the Agency for Identification Documents, Registers and Data Exchange of BiH on all vehicles and vehicles registered for the first time in 2012, were used for the calculation of the amount of c-PentaBDEs. The results were obtained by using the following formula:

*[all vehicles registered in December 2012] - [all vehicles registered in January 2012] - [vehicles registered for the first time from February to December 2012]*

Table 89 shows the total amount of c-PentaBDEs in ELV vehicles (ELV cars, ELV buses, ELV trucks).

**Table 89:**  
Total quantity of c-pentaBDEs in ELV vehicles in BiH

Number of ELV cars/trucks (produced before 2005)	Average quantity of c-pentaBDEs per car	Total quantity of c-pentaBDEs in ELV cars/trucks in 2012						
		21,614	160 g per car (0.16 kg)	21,614	x	0.16	x	0.05
		Number of cars and trucks	x	Average quantity of c-penta BDEs per car/truck	x	Regional factor *	=	kg
Number of ELV buses (produced before 2005)	Average quantity of c-pentaBDEs per bus	Total quantity of c-pentaBDEs in ELV buses in 2012						
		1,170	1000 g per bus (1 kg)	1,170	x	1	x	0.05
		Number of buses	x	Average quantity of c-penta BDEs per bus	x	Regional factor*	=	kg
TOTAL QUANTITY OF c-pentaBDEs		Sum of -pentaBDEs	231.41 kg					

\* Evaluation factor for c-pentaBDEs treated vehicles according to production region (in the period 1975-2004)

### Calculation of PBDEs in the transport sector

According to the Stockholm Convention, the amounts of c-pentaBDE or c-OctaBDE in the flow of materials are not reported; only the relevant PBDEs homologues: tetraBDE, pentaBDE, hexaBDE and heptaBDE which are on the list of chemicals of the Stockholm Convention are reported. Differentiation between different homologues is done due to the fact that not all PBDEs homologues are on the list of chemicals of the Stockholm Convention, such as octa, nona and decaBDE, and that not all homologues are present in the same quantities in products covered by this group of substances (hereinafter referred to as BDE for purposes of simplicity). The quantities of BDE in the transport sector are shown in Table 90.

**Table 90:**  
Calculation of PBDEs homologues present in the transport sector for relevant life cycles

	Distribution of c-PentaBDE homologues	PBDEs in vehicles in use in 2013 (kg)	PBDEs in imported vehicles in 2012 (kg)	PBDEs in ELV vehicles in 2011 (kg)
c-PentaBDE		Σ c-PentaBDE 416.58	Σ c-PentaBDE 914,240.51	Σ c-PentaBDE 231.41
tetraBDE	33%	137.47	301,699.37	76.37
pentaBDE	58%	241.61	530,259.50	134.22
hexaBDE	8%	33.33	73,139.24	18.51
heptaBDE	0,50%	2.08	4,571.20	1.16

### 2.3.3.5 Existing legal framework in the field of PBDEs and HBB

In Republika Srpska, the *Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals* (Official Gazette of RS, no. 100/10, 63/13) regulates use of PBDEs and HBB, while in Federation of BiH and Brčko District legislation which restricts and/or prohibits the manufacture, placing on the market and use of PBDEs and HBB has not been adopted.

Management of POPs chemicals in BiH, including PBDEs, prohibitions and restrictions relating to PBDEs in BiH, disposal and transportation of hazardous waste is described in *Chapter 2.2.5 Management of POPs Chemicals*.

According to the *Regulation on Waste Categories with Lists in FBiH* (Official Gazette of FBiH, no. 9/05), the *Regulation on Waste Categories with Catalogue in RS* (Official Gazette of RS, no. 39/05) and the *Regulation on Waste Categories with Lists in BD* (Official Gazette of BD, no. 32/06), PBDE containing waste is listed under the following key numbers:

- 20 01 35\* - discarded electrical and electronic equipment not listed under 20 01 21 and 20 01 23, containing hazardous components

- 20 01 35 - discarded electrical and electronic equipment not listed under 20 01 21 and 20 01 23
- 16 01 - old vehicles from different means of transportation (including off-road machinery) and waste from dismantling of old vehicles and vehicle maintenance (except 13, 14, 16 06 and 16 08).

In FBiH, the *Regulation on Waste from Electrical and Electronic Products* (Official Gazette of FBiH, no. 87/12) prescribes that the operator of the electrical and electronic waste management system (legal entity engaged in waste equipment management activities in whose name the permit for electrical and electronic waste management permit is issued) is required to take over the waste equipment from the distributor and utility companies, transport it to the processing plant, perform pre-processing and ensure its further processing or disposal. The permit for waste equipment management is issued by the Federal Ministry of Environment and Tourism to the system operator on the basis of a request for obtaining a waste treatment permit, and the request includes a waste equipment management plan. Currently, there are no facilities for treatment of such waste in BiH.

Annex 1 of the Regulation defines classes of electrical and electronic equipment, Annex 2 defines the list of classified products, Annex 3 defines the treatment of collected waste equipment in the waste equipment treatment facilities, Annex 4 defines the technical requirements for treatment facilities, and Annex 5 defines the label for mandatory special (separate) collection of waste equipment.

In Republika Srpska and Brčko District, by-laws governing electrical and electronic waste management have not been adopted yet.

Annex 5 provides a parallel overview of management of PBDEs according to regulations on the level of BiH, FBiH, RS and BD.

### 2.3.3.6 Conclusions

Chemicals with the collective term PBDEs were most often used for treatment of polyurethane foam used in the transport sector. In addition, PBDEs were used in the manufacture of the housings of electrical and electronic equipment (EEE), especially for CRT (cathode ray tubes) housing and office equipment, therefore the PBDEs/PFOS Inventory Group focused on the inventory of the substances which were applied in the transport sector and EEE in BiH.

According to the calculations shown in this report, the greatest amount of PBDEs in electronic and electrical equipment was found in the equipment of users, over 10,000 kg, while the maximum amount of PBDEs in the transport sector were found in the vehicles imported in 2012, over 900,000 kg.

According to the inventory of PBDEs:

- PBDEs are not produced in BiH, they are only used in products that are manufactured in or imported to BiH;
- In BiH approximately 92,592 tons of e-waste is generated each year, i.e. about 24.4 tons per capita;
- There are no records of the quantities of second-hand EEE imported and exported from BiH, nor of the status of such equipment;
- It is unclear what proportion of the second-hand equipment containing EEE is functional within a reasonable time after its sale;
- There are no records of vehicles that reached their end-of-life (ELV), nor are they disposed of in an environmentally sound manner.

### 2.3.4 PRELIMINARY INVENTORY OF DDT - ANNEX B OF THE STOCKHOLM CONVENTION

In BiH, the use of DDT pesticides was discontinued in agriculture in the period from 1971 to 1973, whereas in public health and forestry it was used until 1989. Based on research the POPs Pesticides Inventory Group concluded that DDT pesticides were not produced on the territory of BiH, nor were they imported, exported and used after 1989.

The available data on production, use, import and export are given along with information about other POPs pesticides in *Chapter 2.3.1 Preliminary inventory of POPs pesticides*.

### **2.3.5 PRELIMINARY INVENTORY PERFLUOROCTAN SULFONATE (PFOS), ITS SALTS AND PERFLUOROCTAN SULFONYL FLUORIDE (PFOSF) - ANNEX B, PART III OF THE STOCKHOLM CONVENTION**

For the PFOS inventory development, the PBDEs/PFOS Inventory Group used the UNEP "Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants" (UNEP 2012) – hereinafter referred to as: PFOS Guidance (UNEP 2012). The main objective of the inventory of PFOS is obtaining the data needed for the carrying out the obligations under the Stockholm Convention in terms of developing the National Implementation Plan.

The term perfluorooctane sulfonate (PFOS) and related substances refers to a large group of substances containing per and polyfluorinated sulfonate with a chain of eight carbons, which can be simple compounds - PFOS salts (e.g., potassium, lithium, ammonia or diethanolamine salt) or polymers containing PFOS.

PFOS are in the category of the so-called "new chemicals" of the Stockholm Convention. Namely, in 2009 the Conference of the Parties (COP) introduced amendments to the Stockholm Convention on POPs in order to add the following substances to Annexes A and B:

- Perfluorooctane sulfonic acid (PFOS) and its salts
- Perfluorooctane sulfonyl fluoride (PFOSF)

Similar to all POPs, the abovementioned substances pose a threat to human health and the environment, do not decompose in the environment and accumulate in organisms, just as pesticides and PCBs. Due to improper management of these substances in the industry and improper management of these substances when they are no longer used and become waste, these substances can accumulate in the tissues of migrating animals as a result of emissions and/or releases into the air and water. In this manner, the substances can be transferred across international borders and reach far away from the place of emission and/or discharge, and can re-accumulate in terrestrial and aquatic ecosystems.

According to PFOS Guidance (UNEP 2012), these substances have been produced for over 50 years. Due to their unique physical properties, water resistance and resistance to grease, they have a wide application in industries as chemical agents (such as the electronics industry), in the preparation of materials or as supplements in the manufacturing of products (e.g., textile industry), and for professional use of chemical products (such as fire-fighting foam). Products containing PFOS are textiles, furniture, clothing, leather products and various industrial and household cleaning products. In addition, significant use of PFOS is in fire-fighting foams for extinguishing fires caused by liquid fuels. Therefore, the PBDEs/PFOS Inventory Group focused on inventory of PFOS substances which are used for such purposes.

PFOS have been removed from use in certain products such as impregnation of synthetic carpets in some regions, e.g. in North America and some parts of Europe.

#### **Production of goods**

Products that traditionally contain PFOS are textiles, furniture, clothing, leather products, etc. Information on the application of PFOS related substances in 2000 reveals that more than 75% of the total consumption of PFOS was in consumer goods (PFOS Guidance, UNEP 2012).

Applications with a potential risk of direct exposure to PFOS, such as textiles, clothing, footwear, cosmetics, shampoos, food packaging, are significant due to the potential consequences to human health. The use of PFOS in synthetic carpets, textiles and furniture could cause the occurrence of PFOS in house dust and the air in closed spaces, and directly expose people, especially babies and small children to the negative impacts of these substances (PFOS Guidance, UNEP 2012).



## Industrial and household surfactants

PFOS derivatives are used as surfactants (surface active agents) to reduce surface tension and improve moisture and rinsing in a variety of industrial and household cleaning products such as car wax, alkaline cleaners, denture cleaners and shampoos, cosmetics and hand creams, dishwashing liquids, waterproof sprays and products for car washing. PFOS derivatives are also used in products for cleaning stains on carpets, as well as cleaning and polishing agents for floors and cars. Concentrations of PFOS derivatives in the final product usually range between 0.005% and 0.01%, but can also be 10 times higher (PFOS Guidance, UNEP 2012).

## Fire-fighting foams

These foams are used for extinguishing fires caused by liquid fuels. They are primarily intended for fire suppression in flammable liquids such as oil, gasoline, other water-insoluble hydrocarbons, and flammable, water soluble liquids such as alcohol, acetone, etc. Fire-fighting foams are specifically used for systems and installations with large quantities of flammable liquids (PFOS Guidance, UNEP 2012).

### 2.3.5.1 Process of developing the PFOS preliminary inventory

The methodology used by the PBDEs/PFOS Inventory Group for inventory of PFOS was based on methodology developed by UNEP (PFOS Guidance, UNEP 2012). In order to carry out the inventory of PBDEs, the PBDEs/PFOS Inventory Group used all the available data on imports, exports, trade and use of POPs in BiH, as well as the old stocks.

Due to widespread use of these substances, the PBDEs/PFOS Inventory Group focused on the amount of PFOS in these trade flows in which the occurrence of PFOS is most significant<sup>79</sup>:

- fire-fighting foam,
- textile and leather,
- coatings and impregnating agents for textiles and carpets,
- cleaning and polishing agents,
- insecticides.

The preliminary inventory of PFOS was carried out in the period from May to December 2013 and the process of developing the inventory, together with the process of developing the inventory of PBDEs, is described in detail in Annex 6.

### 2.3.5.2 Inventory of fire-fighting foam quantities

#### Estimate of quantities of PFOS and PFOS-related substances in used fire-fighting foams

According to PFOS Guidance (UNEP 2012), the quantities of PFOS are estimated on the basis of the share (%) of PFOS in various fire-fighting foams. Since the interest groups contacted by the PBDEs/PFOS Inventory Group did not provide information on the concentrations of PFOS in fire-fighting foams in their responses to the questionnaires, the following range of PFOS concentrations in fire-fighting foams is used: 0.5 - 1.5 wt%<sup>80</sup>.

According to collected data, the total quantities of fire-fighting foams in BiH in stocks amount to 8,455 litres, and the range of PFOS quantities in BiH is 4.22 to 12.67 litres.

Based on the responses received by the PBDEs/PFOS Inventory Group through the questionnaires, an overview of the quantities and year of purchase of used fire-fighting foams in BiH, as well as the names of manufacturers or countries of origin, is provided in Table 91.

<sup>79</sup> In accordance with "Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants" (UNEP 2012)

<sup>80</sup> wt% - weight percent

**Table 91:**  
Fire-fighting foams  
currently in use in BiH  
(PFOS content is not  
known)

Name of fire-fighting foam currently in use	Manufacturer of fire-fighting foam	Code or product number / CAS <sup>81</sup> registration number	Quantity of fire-fighting foam (l)	Year of purchase
Angus-Fire	-	FP 570 6%	135	2000 (donation)
Liquid concentrate fire extinguishing aqueous film tip 3.390	3 m Canada inc: London Ontario	N5Y3G2 tip-3 3%	5,600	2001 (donation from the Canadian battalion) 2012
Pyrene standard foam - Maring Liquid	Chubb Fire Security Ltd. England	-	25	-
Ecopol	France	-	225	2011
Bio foam 15	France	-	50	2008
Biovarsal	-	-	40	2012
Plurex N - synthetic fire fighting foam class A and B	SABO FOAM S.R.L. (BG)	-	1,050	2010/2011
Plurex N-75	Italy	-	-	2010
Sintok 4S	Italy	-	-	2010
Biofor-C	-	-	25	-

The average number of fire-fighting exercises held by cantonal/municipal fire brigades is 1-2 exercises per year, during which 10-50 l of fire-fighting foam is consumed. Most exercises are performed on polygons of fire brigades, and occasionally in areas used for waste disposal.

Table 92 provides an overview of fire sites in the past 10 years with rough estimates of the quantities of used fire-fighting foams.

**Table 92:**  
Overview of fire  
locations and estimates  
of used fire-fighting  
foams in BiH

Municipality	Location of fire	Date	Type of PP foam used	Estimate of PP foam quantity (l)
Bihać	Unknown	2001-2012	Liquid concentrate fire extinguishing film forming tip 3.3%	500
Ključ	Scrap car yard	Oct 2012	Angus Fire	3-5
Ključ	Car dealership	Oct 2011	Liquid concentrate	3-5
Lukavac	Unknown	2007	-	70
Muskići	Unknown	2008	-	20
Duboštica	Unknown	2008	-	25
Huskići	Unknown	2009	-	20
Lukavac M.	Unknown	2010	-	25
Poljice	Unknown	2010	-	25
Poljice	Unknown	2011	-	50
Lukavac M.	Unknown	2011	-	40
Kalesija	Unknown	2003	-	20

Moreover, a certain number of civil protection services, mines and companies do not use fire-fighting foams as fire extinguishers, but use fire appliances based on dry powder, fire appliances based on CO<sub>2</sub>, and water.

### 2.3.5.3 Estimates of PFOS quantities based on national statistics

According to PFOS Guidance (UNEP 2012), the annual net consumption of PFOS and related substances is estimated based on national statistics on imports, production and exports. In order to quantify the quantities of PFOS in certain categories of use, data were processed through statistics on production, import and export quantities provided by the statistical agency.

81 CAS - Chemical Abstract Service

Table 93 shows the total PFOS quantities. Data on imports and exports, and data on production<sup>82</sup> have been obtained from the Agency for Statistics of BiH for the year 2012.

Category of article or preparation	Import (kg annually)	Production (kg annually)	Export (kg annually)	PFOS content			PFOS quantity (kg annually) lowest / highest value		
				Approximate values (mg PFOS/kg of article or preparation)					
Fire fighting foams	1,833,819	0	1,363,905	5,000	-	15,000	2,350	-	7,049
Certain medical devices	772,120	0	678,833	150	ng/CCD filter		0.000014		
Insecticides	582,994	0	27,064	100	-	1,000	56	-	556
Coating and impregnation - synthetic carpets	17,009,234	42,332	268,954	500	-	5,000	8,391	-	83,913
Coating and impregnation - textiles	1,342,767	17,903	14,207	500	-	5000	673	-	6,732
Coating and coating additives	25,863,328	2,143,532	2,310,507	1000	-	10000	25,696	-	265,964
Cleaning agents, waxes and polishes	197,082,565	10,449,018	7,664,965	50	-	100	9,993	-	19,987
<b>TOTAL quantity of PFOS per year (kg)</b>							<b>47,159</b>	<b>-</b>	<b>284,200</b>

*Table 93:  
Total quantity of PFOS in BiH in 2012 according to national statistics*

Due to inconsistencies in product codes (statistical data on production of items do not have the same production codes as customs tariffs for imported and exported products), the PBDEs/PFOS Inventory Group considers these calculations to be an estimate.

For this reason, the calculation of the quantities of fire-fighting foams which is based on statistics is several times higher than the calculation of quantities of PFOS from fire-fighting foams which is based on data received by the PBDEs/PFOS Inventory Group through the questionnaires (Table 92). Namely, the tariff code used for fire-fighting foams in national statistics, i.e. 8424 or 8424 10 00 00, covers all mechanical appliances for projecting, dispersing or spraying liquids or powders, fire extinguishers, whether or not charged, spray guns and similar appliances, steam or sand blasting machines and similar jet projecting machines. As a result, spraying appliances are also included in this group, and therefore, even though BiH does not manufacture fire-fighting foams, the export of goods appears under this tariff code, and the assumption is that it only refers to spraying appliances or parts thereof.

#### 2.3.5.4 Existing legal framework in the field of PFOS, its salts and PFOF

In Republika Srpska, the *Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals* (Official Gazette of RS, no. 100/10, 63/13) prohibits the use of PFOS with certain exceptions, while in Federation of BiH and Brčko District legislation which restricts and/or prohibits the manufacture, placing on the market and use of PFOS has not been adopted.

Management of POPs chemicals in BiH, including PFOS, prohibitions and restrictions relating to PFOS in BiH, disposal and transportation of hazardous waste is described in *Chapter 2.2.5 Management of POPs Chemicals*.

In addition to legislation governing the management of chemicals, certain aspects of PFOS are regulated by the entity laws pertaining to the field of fire-fighting.

In FBiH, the *Law on Fire Protection and Fire Service* (Official Gazette of FBiH, no. 65/09) prescribes that fire-fighting products, prior to their placing on the market, must comply with the requirements of applicable regulations and standards, as evidenced by a certificate of conformity. The Law also stipulates that the production and circulation of devices, equipment

<sup>82</sup> Industrial Production in Bosnia and Herzegovina for 2012 – Previous PRODOCOM Results, Agency for Statistics of BiH, July 2013

and products designed for fire-fighting must be performed in accordance with special regulations, and in case there are no adopted standards and regulations in BiH, international standards and regulations pertaining to these issues accepted by BiH may be applied. Furthermore, hazardous materials must not be used and stored in a manner that is not in accordance with the prescribed technical norms and standards and unsafe for the operator and the environment.

According to the *Law on Fire Protection of RS* (Official Gazette of RS, no. 37/12) and the *Law on Fire Protection of BD* (Official Gazette of BD, no. 9/06), importers or representatives of foreign companies are required, prior to putting fire-fighting products into circulation, to obtain a certificate from a registered or authorized organization in terms of the Law on Standardization, and to issue, for equipment used in industrial and other processes with easily combustible or explosive substances, proof of conducted testing of their compliance with the regulations and standards on fire protection or to obtain the opinion of authorized companies and other legal entities for providing an expert evaluation of the compliance with regulations and standards.

According to the *Regulation on Waste Categories with Lists in FBiH* (Official Gazette of FBiH, no. 9/05), the *Regulation on Waste Categories with Catalogue in RS* (Official Gazette of RS, no. 39/05) and the *Regulation on Waste Categories with Lists in BD* (Official Gazette of BD, no. 32/06), PFOS containing waste is listed under the following key numbers:

- 20 01 35\* - Discarded electrical and electronic equipment not listed under 20 01 21 and 20 01 23, containing hazardous components
- 20 01 35 - Discarded electrical and electronic equipment not listed under 20 01 21 and 20 01 23

Annex 5 provides a parallel overview of management of PFOS according to regulations on the level of BiH, FBiH, RS and BD.

#### EU legislation in the field of PFOS

BiH, as a potential candidate country for EU membership, assumed the obligation to harmonize its legislation with the EU legislation on the day of the signing of the Stabilization and Association Agreement (16/6/2008).

The key EU legislation dealing with PFOS management is as follows:

- Regulation (EC) No. 850/2004 of 29 April 2004 on Persistent Organic Pollutants substances (POPs) amended by Council Regulation (EC) No. 1195/2006, 172/2007 and 323/2007)
- Regulation (EC) No. 1907/2006 (amended by Regulation No. 207/2011) on the registration, evaluation, authorization and restriction of Chemicals (REACH) with regards to Annex XVII (BDE, penta-derivative and PFOS).

#### 2.3.5.5 Conclusions

Preliminary inventory of PFOS in BiH has shown that BiH has never been manufactured PFOS, but only imported and used products that may contain PFOS. Estimated amount of PFOS in BiH in 2012 (according to national statistics) ranges from 47 (t/year) to 284 (t/year).

The main problems the PBDEs/PFOS Inventory Group identified during developing the preliminary inventory are:

- Lack of legislation for management of chemicals in general in FBiH and BD and inconsistency in adopting laws and bylaws in the entities and BD - in the Federation of BiH and the Brcko District, legislation that restricts and/or prohibits the manufacture, marketing and use of PFOS has not been adopted. In Republika Srpska PFOS are regulated by the *Regulation Amending the Regulation on Conditions for Restricting and Prohibiting the Manufacture, Trade and Use of Chemicals* (Off. Gazette of RS, no. 63/13) (Annex 2, Part A: List of prohibited substances from POPs Stockholm Convention);
- Inconsistency in the labels of products - statistical data on production of items do not have the same product codes as the customs tariff for imported and exported products – inventory of quantities of these chemicals based on statistical data on production and on imports and exports is therefore estimated;

- Users of fire-fighting foam have insufficient knowledge of the characteristics of these products - in their responses to the questionnaires sent by the PBDEs/PFOS Inventory Group, the stakeholders did not provide the required level of information on practices for handling fire-fighting foam or their properties;
- Importers and distributors of widely used products have insufficient knowledge of the presence of PFOS in products and processes which are placed on the market in BiH - in their responses to the questionnaires sent by the PBDEs/PFOS Inventory Group, the stakeholders did not provide any information relevant to the inventory of PFOS in BiH.

Therefore, due to the lack of official and verified data, the preliminary inventory of PFOS in BiH is based on estimates and calculations that PBDEs/PFOS Inventory Group carried out in line with PFOS Guidance (UNEP, 2012).

## 2.3.6 PRELIMINARY INVENTORY OF UNINTENTIONAL PRODUCTION AND RELEASE OF CHEMICALS – ANNEX C OF THE STOCKHOLM CONVENTION

### 2.3.6.1 Introduction

The preliminary inventory of polychlorinated dibenzo-p-dioxins (PCDD), polychlorinated dibenzofurans (PCDF) and other unintentionally produced POPs is part of the preliminary inventory of POPs in BiH, and was carried out by the PCDD/PCDF Inventory Group within the framework of preparations for the implementation of the Stockholm Convention on POPs.

For the development of the PCDD/PCDF inventory, the methodology prescribed by the UNEP Chemicals *“Toolkit for Identification and Quantification of Releases of Dioxin and Furan and other Unintentional POPs”* (UNEP 2013) – hereinafter referred to as: “UNEP Toolkit (2013)” was used. This methodology was used for determining the levels of dioxin, furan and other unintentionally produced POPs emissions (Annex C) into the environment.

Pursuant to Article 5 of the Convention, dioxins and furans are defined as chemicals, and are listed in Annex C, which refers to unintentionally produced POPs. The term “unintentionally produced” refers to POPs that are unintentionally formed and released into the environment from anthropogenic sources. The following unintentionally produced POPs are listed in Annex C of the Convention:

- Polychlorinated dibenzo-p-dioxins (PCDD)
- Polychlorinated dibenzofurans (PCDF)
- Polychlorinated Biphenyls (PCB)
- Hexachlorobenzene (HCB)
- Pentachlorobenzene (PeCBz)

According to the UNEP Toolkit (2013), PCDD/PCDF emissions are followed by emissions of other unintentionally produced POPs, which can be eliminated or minimized by the application of the same measures used in dealing with PCDD/PCDF emissions. Once a comprehensive inventory of PCDD/PCDF emissions is developed, it will be possible to identify the priority sources, take measures and develop action plans for the reduction of emissions of unintentionally produced POPs. Therefore, for practical reasons, UNEP Toolkit (2013) recommends that the inventory development should focus on PCDDs/PCDFs, because these substances indicate the presence of other unintentionally produced POPs. It is believed that the PCDDs/PCDFs constitute sufficient grounds for the identification and prioritization of sources of all these substances as well as for devising measures for controlling the POPs covered by Annex C and the evaluation of their effectiveness.

In accordance with the recommendations of UNEP Toolkit (2013), this preliminary inventory is focused on dioxins and furans.

The term “dioxins and furans” includes 135 different compounds that fall within the PCDF class: polychlorinated dibenzofurans and 75 compounds that fall within the PCDD class: polychlorinated dibenzo-p-dioxins.

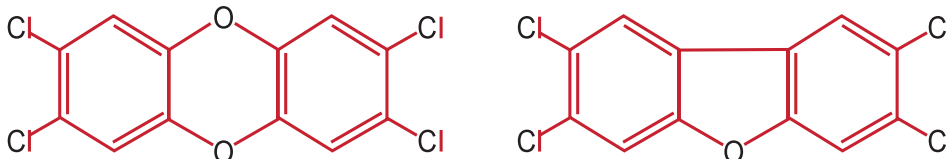
Dioxins and furans are synthetic chemical compounds that do not occur naturally, but are formed as unwanted/by-products of industrial processing and manufacturing, as a result

of combustion of almost all organic substances in the presence of chlorine or its organic or inorganic compounds. They are stable, insoluble in water, but very easily dissolvable in fats and oils (lipophilic), which means that the fat deposited in living organisms.

The first of these, TCDD (2,3,7,8 tetrachloro dibenzo-dioxin) was synthesized in 1957, and after the disaster that occurred in 1976, at a chemical plant in Seveso, Italy, it was named the Seveso-dioxin. The explosion at this chemical plant also caused an ecological disaster which motivated experts to conduct a scientific research on the entire group of these compounds, especially with regard to their toxicity.

Dioxins and furans differ from each other only by the presence or absence of oxygen atoms in their structure.

*Figure 25:*  
The structure of  
polychlorinated  
dibenzodioxins (left)  
and polychlorinated  
dibenzofurans (right)



The main sources of dioxins and furans are the following processes:

- combustion processes,
- bleaching and chlorination processes,
- production of various other chemical compounds.

According to current knowledge, 2,3,7,8 dioxins and furans are considered the most toxic. This group consists of all compounds which contain at least one chlorine atom in the 2,3,7 and 8 positions (Figure 25). Amongst all the 210 known dibenzo-p-dioxins and dibenzofurans, 17 compounds are as such.

In addition to the results of animal experimentation, knowledge of the effects of dioxin and furan emissions also comes from over 20 industrial disasters that caused about 1000 cases of poisoning with dioxins and furans<sup>83</sup>.

Dioxins and furans are formed as by-products in a large number of chemical processes. They are very stable chemical compounds; they can remain in the environment for a long time and recur in all its segments:

- air,
- water (rivers and lakes, oceans, estuaries, sediments),
- land/soil.

PCDD/PCDF may be present in:

- waste (including liquids, sludge and solid residues),
- products (such as chemical products or consumer goods such as paper, textiles, etc.),

and they can be transmitted from one segment of the environment to another.

Based on the foregoing, it could be said that there are four sources of PCDD and PCDF emissions:

- Chemical manufacturing processes such as: obtaining chlorinated phenols and oxychloride in order to obtain solvents for the food industry, or in the production of pulp and paper,
- Thermal processes and combustion processes - including waste incineration (combustion of solid and liquid fuels and thermal treatment of metals),

<sup>83</sup> Weber R, Tysklind M, and Gaus C (2008). "Dioxin— Contemporary and future challenges of historical legacies (Editorial, dedicated to Otto Hutzinger)". *Env Sci Pollut Res* 15(2): 96–100 (p.97); Geusau A, Abraham K, Geissler K, Sator MO, Stingl G, Tschachler E (2001). "Severe 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD) intoxication: clinical and laboratory effects"; Belgian PCB and Dioxin Incident of January–June 1999: Exposure Data and Potential Impact on Health, *Environ Health Perspect* 109:265–273 (2001); Contamination of chicken eggs near the Spolchemie Ústí nad Labem chemical plant in the Czech Republic by dioxins, PCBs and hexachlorobenzene, International POP Elimination Network (IPEN) 2005

1. Biogenic processes which can cause the formation of PCDD/PCDF from precursors - there is evidence that it occurs during composting,
2. "Old" sources such as old waste landfills and contaminated land and sediments that have accumulated dioxins and furans during a prolonged period of time.

The largest amounts of dioxins and furans are released due to combustion of wood in households and devices for thermal treatment of waste (communal, industrial facilities and hospitals). Other significant sources are processes of steel production in electric arc furnaces, road transportation and the fuel combustion processes in power plants (thermal power plants, heating plants etc.).

### 2.3.6.2 Process of developing the preliminary inventory of polychlorinated dibenzo-p-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF)

The PCDD/PCDF Inventory Group used the UNEP Chemicals methodology specified in the guidelines "Toolkit for Identification and Quantification of Releases of Dioxin and Furan and other Unintentional POPs" (UNEP 2013).

The UNEP methodology suggests five basic steps in the process of developing the dioxin and furan inventory:

1. Identification of the main source groups of PCDD/PCDF;
2. Identification of categories, current activities and potential release routes of PCDD/PCDF in the environment;
3. Collecting data on specific processes defined in the UNEP Toolkit (2013), such as potential sources of PCDD/PCDF;
4. Quantification of sources of PCDD/PCDF, calculation of emissions with the help of emission factors specified in the UNEP Toolkit (2013);
5. Cumulative results of the inventory.

This methodology characterizes the main PCDD/PCDF sources into 10 main categories<sup>84</sup> in accordance with which the inventory was developed. The PCDD/PCDF Inventory Group used a "top-down" approach for collecting data, i.e. collecting data on the extent of the processes identified as potential sources in the country, and subsequently contacting a specific industry/subject by sending questionnaires, making phone calls or arranging meetings.

The preliminary inventory of PCDD/PCDF was carried out in the period from May to December 2013, and the process of developing the inventory is described in detail in Annex 6.

#### Identification of the main source groups and categories of PCDD/PCDF and potential release routes of PCDD/PCDF

The main sources of PCDD/PCDF have been determined by the categorization of the UNEP methodology. The source categories are specified in the methodology which consists of ten source groups. The following table presents the ten source groups of dioxins and furans.

No.	Main source categories of dioxin and furan releases into the environment	Potential Release Route				
		Air	Water	Land	Product	Residue
1	Waste incineration					
a	Municipal solid waste incineration	x	(x)			X
b	Hazardous waste incineration	x	(x)			X
c	Medical waste incineration	x	(x)			X
d	Light fraction shredder waste incineration	x				X
e	Sewage sludge incineration	x	(x)			X
f	Waste wood and waste biomass incineration	x				X
g	Animal carcass incineration	x				X
2	Ferrous and non-ferrous metal production					
a	Iron ore sintering	x		x	x	X
b	Coke production	x	x			X
c	Iron and steel production	x				X

*Table 94:  
Main source groups  
with categories and  
potential release routes  
of PCDD/PCDF in the  
environment*

84 Check out the web page: [http://toolkit.pops.int/Publish/Popups/07\\_Table1.html](http://toolkit.pops.int/Publish/Popups/07_Table1.html)

No.	Main source categories of dioxin and furan releases into the environment	Potential Release Route				
		Air	Water	Land	Product	Residue
d	Copper production	x	x			X
e	Aluminum production	x				X
f	Lead production	x				X
g	Zinc production	x				X
h	Brass and bronze production	x				X
i	Magnesium production	x	x			X
j	Thermal non-ferrous metal production	x	x			X
l	Shredderresidue waste	x				X
m	Thermal processing of materials	x	(x)	x		X
<b>3</b>	<b>Heat and power generation</b>					
a	Use of fossil fuel	x				X
b	Use of biomass	x				X
c	Landfill gas combustion	x				X
d	Household heating (biomass) and cooking	x		(x)		X
e	Domestic heating (fossil fuels)	x		(x)		X
<b>4</b>	<b>Production of mineral products</b>					
a	Cement production	x				X
b	Lime production	x				X
c	Brick production	x				X
d	Glass production	x				X
e	Ceramics production	x				X
f	Asphalt production	x			x	X
g	Oil shale processing	x				X
<b>5</b>	<b>Transport</b>					
a	4-Stroke engines	x				
b	2-Stroke engines	x				
c	Diesel engines	x				(x)
d	Heavy oil fired engines	x				(x)
<b>6</b>	<b>Open burning processes</b>					
a	Biomass burning	x	(x)	x		(x)
b	Waste burning and accidental fires	x	(x)	x		(x)
<b>7</b>	<b>Production and use of chemicals and consumer goods</b>					
a	Pulp and paper production	x	x		x	X
b	Chlorination of inorganic chemicals	x	x		x	X
c	Chlorination of aliphatic chemicals	x	x	(x)	x	X
d	Chlorination of aromatic chemicals	x	x	(x)	x	X
e	Other chlorinated and non-chlorinated chemicals	x	x	(x)	x	X
f	Petroleum industry (refineries)	x				X
g	Textile industry		x		x	X
h	Leather industry		x		x	X
<b>8</b>	<b>Miscellaneous</b>					
a	Drying of biomass (wood)	x			x	X
b	Cremation	x				X
c	Smoke houses	x			x	X
d	Dry cleaning		x		x	X
e	Tobacco smoking	x				X



No.	Main source categories of dioxin and furan releases into the environment	Potential Release Route				
		Air	Water	Land	Product	Residue
<b>9</b>	<b>Waste treatment/disposal</b>					
a	Landfills and illegal dumping sites		x	x		
b	Sewage sludge treatment	(x)	x	x	x	X
c	Open water dumping (rivers, lakes and seas)		x	x		
d	Composting			x	x	
e	Waste oil disposal (non-thermal)	x	x	x	x	X
<b>10</b>	<b>Identification of potential hot spots</b>	<b>Site-specific evaluation</b>				
a	Production of chlorine					
b	Production of chlorinated organics					
c	Application of PCDD/PCDF containing pesticides and chemicals					
d	Timber manufacture and treatment					
e	Textile and leather factories					
f	Use of PCB					
g	Use of chlorine for production of metals and inorganic chemicals					
h	Waste incinerators					
i	Metal industries					
j	Fire accidents					
k	Dredging of sediments and contaminated flood plains					
l	Dumps of wastes/residues from groups 1-9					
m	Kaolin or ball clay sites					

### Collecting data on specific processes

The information on the quantities of products produced in a specific country, during a specific period, as well as the manufacturing processes in which the product is formed, is very important for the assessment of dioxin and furan emissions into the environment. Dioxin and furan emissions of the same category can vary significantly depending on the applied technology, process performance and in most cases it is only possible to evaluate the scale of emission.

Data on emissions into all segments of the environment used by the PCDD/PCDF Inventory Group are listed in Annex 6 together with the description of the process of developing the PCDD/PCDF inventory.

### Quantification of PCDD/PCDF, calculation of emissions with the help of emission factors

For the source class of dioxins and furans, the PCDD/PCDF Inventory Group has, in accordance with the UNEP Toolkit (2013), calculated the amount of PCDD/PCDF releases into the environment in BiH based on the equations below. The emission rate is multiplied by the emission factors. There are five emission factors and their sum relates the emission values for dioxins and furans per annum.

$$\begin{aligned}
 \text{PCDD/PCDF released, grams TEQ/year} = & \text{Emission rate} \times \text{Emission factor}_{\text{air}} \\
 & + \text{Emission rate} \times \text{Emission factor}_{\text{water}} \\
 & + \text{Emission rate} \times \text{Emission factor}_{\text{land}} \\
 & + \text{Emission rate} \times \text{Emission factor}_{\text{products}} \\
 & + \text{Emission rate} \times \text{Emission factor}_{\text{residue}}
 \end{aligned}$$

TEQ-toxic equivalent

For the source category, annual emissions are calculated as the sum of the total annual emissions for each class within the categories. For each source group, the annual emission of PCDD/PCDF is the sum of the calculated annual emissions for each source category in the source group. For countries or regions, the total annual emission of PCDD/PCDF is the sum of annual emissions from all source groups.

### Cumulative results of the inventory of dioxins and furans

After the completion of the aforementioned steps to the inventory of dioxins and furans, the PCDD/PCDF Inventory has conducted a summary assessment of the annual emissions of dioxins and furans. Annual emissions of certain categories are summed up so as to obtain the emission per potential release routes of dioxins and furans in the environment, for all specified source categories of dioxins and furans.

#### 2.3.6.3 Inventory of PCDD/PCDF in Bosnia and Herzegovina per sectors

An overview of activities, specific processes and emission factors for certain main source categories of dioxins and furans, according to UNEP methodology, assessment of PCDD/PCDF emissions per each category and overall assessment of the year 2012, performed by the PCDD/PCDF Inventory Group, will be presented in the following chapters.

##### 2.3.6.3.1 Waste incinerators

Waste incinerators are considered to be in group 1 as potential PCDD/PCDF sources in the environment, but due to their low capacity and there being so few of them, they do not represent a significant source in Bosnia and Herzegovina.

In BiH there is only one valid source of data on the basis of which it is possible to calculate and estimate PCDD/PCDF releases into the environment related to the group 1.c- medical waste incineration (Health Centre Gradiška – Republika Srpska). There are no reliable statistical data on the generation and disposal of medical waste. The research conducted as part of the development of the Federal Waste Management Plan 2012-2017 indicated that infectious waste is being sterilized, incinerated or collected by companies authorized for disposal of hazardous waste; however, often infectious waste is being collected by municipal utility companies and disposed of at local (mostly non-sanitary), landfills.

Furthermore, in BiH there is only one valid source of data on the basis of which it is possible to calculate and estimate PCDD/PCDF releases into the environment related to the group 1.g- animal carcass incineration (Ladanušić čistoća, Posušje – Federation of BiH).

The PCDD/PCDF Inventory Group has not been able to find information about the other groups (1.a, 1.b, 1.d, 1.e and 1.f) (competent environment ministries in FBiH and RS have, in written responses, stated that they do not have data on the waste incinerators).

Table 95 shows the assessment of PCDD/PCDF releases into the environment for Group 1 - Waste incinerators.

**Table 95:**  
Estimates of PCDD/  
PCDF releases into the  
environment from Group  
1-Waste incinerators

Group	Cat.	Class	Source categories	Potential release routes (µg TEQ/t)		
				Air	Water	Land
1			Waste incineration			
	c		Medical waste incineration			
		1	Uncontrolled batch combustion, no APCS	40,000		NA
	d		Light fraction shredder waste incineration			
	e		Sewage sludge incineration			
	f		Waste wood and waste biomass incineration			
	g		Animal carcass incineration			
		1	Old furnaces, batch, no/little APCS	500		NA
1			Waste incineration			

ND - not defined, NA - not applicable

### 2.3.6.3.2 Ferrous and non-ferrous metal production

The data used in this category are taken from the official statistics (Agency for Statistics of BiH, Republic Institute of Statistics RS and Federal Institute of Statistics). The largest source of PCDD/PCDF emissions is the production of iron, followed by coke and aluminium production.

#### Group 2. Category a: Iron ore sintering

According to officially available sources (Agency for Statistics of BiH, entity statistical institutes) there are no data related to this group and category (there are data on the production of iron, but not on sintering (melting) – all production of iron is classified as category c). The official statistical data do not offer any information about iron ore sintering.

#### Group 2. Category b: Coke production

Table 96 presents the coke production in BiH in 2012, according to data from the Agency for Statistics of BiH. All production of coke takes place in the Federation of BiH, whereas in Republika Srpska and Brčko District, there is no record of coke production.

	RS	FBiH	BD	BiH
Coke production	-	696,231.00 t	-	696,231.00 t

Table 96:  
Coke production in BiH  
in 2012

#### Group 2. Category c: Iron and steel production in plants and foundries

Table 97 presents the iron and steel production in plants and foundries in BiH in 2012, according to data from the Agency for Statistics of BiH.

	RS	FBiH	BD	BiH
Iron and steel production in plants	3,820.715 t	2,459,051.217 t	2,234.34 t	2,465,106.272 t
Iron and steel production in foundries	2,224.884 t	24,164.713 t	17.97 t	26,407.567 t

Table 97:  
Iron and steel production  
in plants and foundries  
in BiH in 2012

According to official data in BiH, the galvanizing process has also been recorded, but considering the data was presented in effective hours (amount to 201,355 effective hours), it is not included in the table. Data for Republika Srpska states 166,827 eff. hours and for the Federation of BiH 34,528 eff. hours. In Brčko District there is no record of galvanizing process.

	Product	Production				Annual Releases				
		Residue		t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
		Fly Ash	Ash		Air	Water	Land	Product	Fly Ash	Ash
				2	0.060	0	0	0	0.000	0,000
	NA		200	2	0.060 (2.5) <sup>85</sup>				0.000	0,000
				0	0.000	0	0	0	0.000	0,000
				0	0.000	0	0	0	0.000	0,000
				0	0.000	0	0	0	0.000	0,000
				10	0.005	0	0	0	0.000	0,000
	NA	ND	ND	10	0.005					
					0.065	0	0	0	0.000	0,000
										0.0

85 State of the Environment Report in BiH 2012 estimated generation of waste from health facilities in 2009 was 8,150 tons, of which 650 tons accounted for infectious waste. The estimate was made on the basis of literature data on average waste generation from health facilities, which ranges between 2.41 and 3.26 kg / bed / day, of which between 0.19 and 0.88 kg / bed / day accounts for produced infectious waste (source: Cheng et al. (2009): Medical waste production at hospitals and associated factors, Waste Management 29 (1), 440-444.). Taking into account the number of hospitalization days in 2009, which according to data from entity statistical agencies totalled 3,259,977, the estimated quantity of waste from health facilities in 2009 amounted 8,150 tons, out of which 650 tons was infectious waste. According to the UNDP / GEF Guidelines for assessment of dioxin emissions (UNDP/GEF Guidance on estimating baseline dioxin releases for the UNDP global healthcare waste project) it is possible to estimate that medical waste incineration results in release of 2.5 gTEQ/year of dioxins (650 t/year of infectious waste, of which 50% is burned in the open (release factor is 6,600 micrograms per tonne) and 10% is burned in batch type incinerators (release factor 5,900 micrograms per tonne).

**Group 2. Category d: Copper production**

Table 98 presents the copper production in BiH in 2012, according to data from the Agency for Statistics of BiH. All production takes place in Republika Srpska. In the Federation of BiH and Brčko District there is no record of copper production.

*Table 98:  
Copper production in  
BiH in 2012*

	RS	FBIH	BD	BiH
Copper production	8,804 t	-	-	8,804 t

**Group 2. Category e: Aluminium production**

Table 99 presents the aluminium production in BiH in 2012, according to data from the Agency for Statistics of BiH. All production takes place in the Federation of BiH. In Republika Srpska and Brčko District there is no record of aluminium production.

*Table 99:  
Aluminium production in  
BiH in 2012*

	RS	FBIH	BD	BiH
Aluminium production	-	159,660.00 t	-	159,660.00 t

Source categories			Potential release routes (µg TEQ/t)		
Group	Cat.	Class	Air	Water	Land
2			Ferrous and Non-Ferrous Metal Production		
	a		Iron ore sintering		
	b		Coke production		
		1	3	0.06	ND
	c		Iron and steel production in plants and foundries		
			Iron and steel plants		
		1	10	ND	NA
			Foundries		
		1	10	ND	NA
	d		Copper production		
		1	800	0.5	NA
	e		Aluminium production		
		2	4	ND	NA
	f		Lead production		
		2	8	ND	NA
	g		Zinc production		
		4	0.1	ND	NA
	h		Brass and bronze production		
	i		Magnesium production		
	j		Thermal Non-ferrous metal production (e.g., Ni)		
	k		Shredders		
	l		Thermal wire reclamation and e-waste recycling		
2			Ferrous and Non-Ferrous Metal Production		

ND - not defined, NA - not applicable

**Group 2. Category f: Lead production**

Table 100 presents the lead production in BiH in 2012, according to data from the Agency for Statistics of BiH. All production takes place in Brčko District. In Republika Srpska and the Federation of BiH there is no record of lead production.

	RS	FBIH	BD	BiH
Lead production	-	-	3,327.00 t	3,327.00 t

*Table 100:*  
Lead production in BiH in 2012

In BiH there are no official statistical data on performed activities that are classified under the following categories:

- Brass and bronze production,
- Iron, zinc sintering,
- Non-ferrous metal production (e.g. nickel Ni),
- Shredder residue waste,
- E-waste for recycling.

Table 101 presents the data analysis for the identified categories and classes of the UNEP Toolkit (2013) for Group 2.

	Production				Annual Releases			
	Products	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
				Air	Water	Land	Products	Residue
			0	0.000	0	0	0	0.0
			696,231	2.089	1.25322E-07	0	0	0
	ND	ND	696,231	2.089	0.000			
			2,491,514	25	0	0	0	37
			2,465,106	25	0	0	0	36.977
	NA	15	2,465,106	24.651				36.977
			26,408	0.264	0	0	0	0.0
	NA	ND	26,408	0.264				
			9	0.007	0	0	0	0.0
	NA	630	9	0.007	0.000			0.006
			159,660	0.559	0	0	0	63.9
	NA	400	159,660	0.559				63.864
			3,327	0.027	0	0	0	0.2
	NA	50	3,327	0.027				0.166
			0	0.000	0	0	0	0
	NA	ND	0	0.000				
			0	0.000	0	0	0	0.0
			0	0.000	0.0	0.0	0.0	0.0
			0	0.000	0	0	0	0
			0	0.000	0	0	0	0
			0	0.000	0	0	0	0
			0	0.000	0	0	0	0
				27.596	0.000	0.000	0.000	101.013

*Table 101:*  
Estimates of PCDD/  
PCDF releases into the  
environment from Group  
2- Ferrous and non-  
ferrous metal production

### 2.3.6.3.3 Heat and power generation

This group refers to combustion in thermal power plants and plants for energy conversion, industrial combustion, combustion in households (biomass and fossil fuels).

In this group, the largest sources of PCDD/PCDF emissions into the environment are thermal power plants and heating plants, followed by combustion of natural gas and household furnaces.

#### Group 3. Category a: Fossil fuel power plants

According to the official announcements of the Agency for Statistics of BiH, the total consumption of energy sources in thermal power plants in the year 2012, in TJs, amounts to:

- Brown coal and lignite 106,441.00 TJ
- Fuel oil 295.00 TJ
- Diesel fuel, heavy fuel oil 621.00 TJ

*Table 102:  
Consumption of energy  
sources in thermal power  
plants in BiH in 2012*

	RS (TJ)	FBiH (TJ)	BD BiH (TJ)	BiH (TJ)
Brown coal and lignite	37,339 (data from the questionnaires TE Gacko and TE Ugljevik)	69,102	-	106,441
Fuel oil	103 (35% of the total amount in BiH)	192 (65% of the total amount in BiH)	-	295
Diesel fuel	217 (35% of the total amount in BiH)	404 (65% of the total amount in BiH)	-	621

In the subcategory 3a, in 2012 the total amount of natural gas in BiH amounted to 251,990,805 Sm<sup>3</sup> (8,967,644,306.05 MJ, i.e. 8,967,644.31 TJ/a) (Data from the company Gas Promet, Istočno Sarajevo), out of which 45.1% was spent in the industrial sector, 32.9% in households and 22% in heating plants (percentage estimation based on the official data from 2009), which calculated for 2012 amounts to (Table 103):

*Table 103:  
Consumption of natural  
gas in BiH in 2012, per  
categories of consumers*

Consumer category	Consumption in 2012		
	Sm <sup>3</sup>	MJ	TJ/a
Industry	113,647,853	4,044,407,582	4,044,408
Households	82,904,975	2,950,354,977	2,950,355
Heating plants	55,437,977	1,972,881,747	1,972,882

Total consumption of natural gas in industry and heating plants in BiH amounts to: 6,017,289.33 TJ/a.

In the heating plants 1,560,621.19 TJ/a of heavy fuel oil (heating plant Brod, Prijedor, Gradiška), and 213.50 TJ/a of lignite (heating plant Bijeljina) has been consumed.

In Republika Srpska 57,126,089.00 Sm<sup>3</sup> (2,032,956,903.91 MJ, i.e. 2,032,956.90 TJ/a) and in the Federation of BiH 194,864,716.00 Sm<sup>3</sup> of gas (6,934,687,402.13 MJ, i.e. 6,934,687.40 TJ/a) has been consumed (in addition to the industry and heating plants, households are included as well), whereas in Brčko District there is no consumption of natural gas.

In Republika Srpska, for industry, 54,668,081 Sm<sup>3</sup> (1,945,483,309.61 MJ, i.e. 1,945,483.31 TJ/a) (official data from the questionnaires), whereas in the Federation of BiH 58,979,772.06 Sm<sup>3</sup> (2,098,924,272.60 MJ, i.e. 2,098,924.27 TJ/a) has been consumed.

In Republika Srpska in heating plants 1,229,004 Sm<sup>3</sup> (43,736,797.15 MJ, i.e. 43,736.80 TJ/a), whereas in the Federation of BiH 54,208,973.1 Sm<sup>3</sup> (1,929,144,950.18 MJ, i.e. 1,929,144.95 TJ/a) has been consumed.

Total industry and power plants: Republika Srpska – 1,989,220.11 TJ/a, Federation of BiH - 4,028,069.22 TJ/a

### Group 3. Category b: Biomass power plants

According to available data, there is only one heating plant that can be classified under this subcategory and based on the submitted data via questionnaires the obtained information refers to consumption of wood biomass at the amount of 23,684.00 TJ/a (heating plant Gračanica). The PCDD/PCDF Inventory Group has not received information from the official institutions in RS and BD.

	RS (TJ/a)	FBiH (TJ/a)	BD (TJ/a)	BiH (TJ/a)
Consumption of wood biomass	-	23,684	-	23,684

Table 104:  
Consumption of wood biomass in BiH in 2012

### Group 3. Category c: Landfills: gas combustion

The PCDD/PCDF Inventory Group has not been able to obtain official data related to this category for the year 2012.

### Group 3. Category d: Households: heating and cooking with biomass energy

According to official data from the Agency for Statistics of BiH, during 2012, in the field of forestry in BiH 1,267,830.00 m<sup>3</sup> of firewood was produced and consumed, out of which 1,571.00 m<sup>3</sup> were conifers and 1,266,259.00 m<sup>3</sup> broadleaves. For purposes of calculating according to the UNEP Toolkit (2013), this amounts to 3,296.36 TJ/a.

	RS (m <sup>3</sup> )	FBiH (m <sup>3</sup> )	BD (m <sup>3</sup> )	BiH (m <sup>3</sup> )
Firewood (total)	560,777	707,000	53	1,267,830
conifers as firewood	296	1,000	-	1,571
broadleaves as firewood	560,481	706,000	-	1,266,259

Table 105:  
Consumption of firewood in BiH in 2012

Based on the aforementioned, in Republika Srpska 560,777 m<sup>3</sup> of firewood was consumed (296 m<sup>3</sup> of conifers and 560,481 m<sup>3</sup> of broadleaves), i.e. 1,458.02 TJ/a. Official data from the Republic Institute of Statistics of RS was used.

In the Federation of BiH 707,000 m<sup>3</sup> of firewood was consumed (1,000 m<sup>3</sup> of conifers and 706,000 m<sup>3</sup> of broadleaves), i.e. 1,838.2 TJ/a. Official data from the Federal Institute of Statistics was used.

In Brčko District BiH 53 m<sup>3</sup> of firewood was consumed, i.e. 0.13TJ/a. Data were obtained using the data for BiH and by deducting data for Republika Srpska and the Federation of BiH.

According to the available bibliographic data, it is estimated that 1 m<sup>3</sup> of firewood is equivalent to 700 kg and that 1% is ash. Based on these data, an assessment of the amount of ash has been made. A small quantity of wood is being illegally cut and used for personal needs, but it is not possible to estimate the amount.

In BiH 16,554,540 kg of lump charcoal was produced and consumed<sup>86</sup>. In Republika Srpska 15,875,615.00 kg was produced, i.e. 488,968,942 MJ, i.e. 488,968.94 TJ/a, and in the Federation of BiH 678,925.00 kg, i.e. 20,910,890 MJ, i.e. 20,910.89 TJ/a. In Brčko District there is no record of production, even though part of the production from the entity was consumed. There are no official data on consumption; therefore data on the quantity of production were used.

### Group 3. Category e: Household heating –fossil fuel

According to the estimated percentage of the total volume of gas (discussed in Group 3.a) the amount of gas consumed in households is 82,904,974.845 Sm<sup>3</sup> = 2,950,354,976.69 MJ = 2,950,354.98 TJ/a.

In Republika Srpska a volume of 1,229,004 Sm<sup>3</sup> (43,736,797.15 MJ, i.e. 43,736.80 TJ/a) was consumed in households, whereas in the Federation of BiH 81,675,970.84 Sm<sup>3</sup> was consumed (290,661,8179.36 MJ, i.e. 2,906,618.18 TJ/a).

<sup>86</sup> Note: 30.8 MJ/kg amounts to 509,879,832 MJ, i.e. 509,879.832 TJ/a (3% ash)

Table 106 presents the data analysis of the identified categories and classes of the UNEP Toolkit (2013) for Group 3.

**Table 106:**  
Estimates of PCDD/  
PCDF releases into the  
environment from Group  
3- Heat and power  
generation

Source categories			Potential Release Routes (µg TEQ/TJ)			
Group	Cat.	Class	Air	Water	Land	Products
3		Heat and Power Generation				
	a	Fossil fuel power plants				
		2 Coal fired power boilers	10	ND	NA	NA
		4 Heavy fuel fired power boilers	2.5	ND	NA	NA
		6 Light fuel oil/natural gas fired power boilers	0.5	ND	NA	NA
	b	Biomass power plants				
		2 Clean wood fired power boilers	50	ND	NA	NA
	c	Landfill biogas combustion				
	d	Household heating and cooking - Biomass				
		2 Virgin wood/biomass fired stoves	100	ND	ND	NA
		4 Charcoal fired stoves	100	ND	ND	NA
	e	Domestic heating - Fossil fuels				
		6 Natural gas or LPG fired stoves	1.5	ND	NA	NA
3		Heat and Power Generation				

ND - not defined, NA - not applicable

#### 2.3.6.3.4 Production of mineral products

The category of production of mineral products refers to the production processes of mineral products at high temperatures, such as:

- cement,
- lime,
- brick,
- glass,
- ceramics and
- asphalt.

#### Group 4. Category a: Cement production

During the process of cement production, limestone (calcium carbonate, CaCO<sub>3</sub>) is heated in a rotary kiln at high temperature to form lime (calcium oxide, CaO) releasing CO<sub>2</sub> into the atmosphere: CaCO<sub>3</sub> + heat → CaO + CO<sub>2</sub>↑

After the calcination process, silicium-rich substances are added to lime (e.g. clay), to form silicates, which are the main constituents of clinker. After the clinker has cooled, it is pulverized into a fine granular powder and mixed with a small amount of gypsum, creating the final product - Portland Cement.

Table 107 presents the cement production in Bosnia and Herzegovina in 2012. All production takes place in the Federation of BiH, according to official statistics in Republika Srpska and Brčko District there is no production of cement.

**Table 107:**  
Cement production in  
BiH in 2012

	RS (t)	FBiH (t)	BD (t)	BiH (t)
Cement production	-	845,657	-	845,657



	Production		Annual release				Ash generation	
	Residue	TJ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	t/a	
			Air	Water	Land	Products	Residue	
		6,124,646	4.075	0	0	0	1.5	
	14	106,441	1.064				1.490	
	ND	916	0.002					
	ND	6,017,289	3.009					
		23,684	1.184	0	0	0	0.4	
	15	23,684	1.184				0.355	
		0	0.000	0	0	0	0.0	
	µg TEQ/t ash	513,176	51.318	0	0	0	0.1	
	10	3,296	0.330				0.089	887,481
	0.1	509,880	50.988				0.000	496.6
	µg TEQ/t ash	2,950,355	4.426	0	0	0	0.0	
	NA	2,950,355	4.426					
			61.003	0	0	0	1.9	

#### Group 4. Category b: Lime production

Lime production, just like cement production, involves the calcination process in which limestone ( $\text{CaCO}_3$ ) or dolomite ( $\text{CaCO}_3 \cdot \text{MgCO}_3$ ) is heated in a rotary kiln at high temperature, to form quicklime (calcium oxide,  $\text{CaO}$ ) or dolomite lime ( $\text{CaO} \cdot \text{MgO}$ ), releasing  $\text{CO}_2$  into the atmosphere.

Table 108 presents the lime production in Bosnia and Herzegovina in 2012. According to statistical data, there is no production of lime in Brčko District.

	RS (t)	FBiH (t)	BD (t)	BiH (t)
Lime production	145,298	252,504	-	397,802

Table 108:  
Lime production in BiH  
in 2012

#### Group 4. Category c: Brick production

In Bosnia and Herzegovina 372,395 m<sup>3</sup> of bricks were produced. With the help of the bibliographic data on the specific weights of materials, the PCDD/PCDF Inventory Group has estimated that 1m<sup>3</sup> of brick weighs 1,750 kg, which in tons amounts to 212,797.00 t.

According to data from the Republic Institute of Statistics of RS, total production (activity) of bricks in Republika Srpska amounts to m<sup>3</sup> (191,365 m<sup>3</sup>), i.e. 109,351.40 t. In the Federation of BiH 181,030 m<sup>3</sup> of bricks were produced, i.e. 103,445.71 t.

	RS (m <sup>3</sup> )	FBiH (m <sup>3</sup> )	BD (m <sup>3</sup> )	BiH (m <sup>3</sup> )
Brick production	191,365	181,030	-	372,395

Table 109:  
Brick production in BiH  
in 2012

According to official statistics, there is no production of bricks in Brčko District.

**Group 4. Category d: Glass production**

In Bosnia and Herzegovina glass production totalled 2.449 t. All production takes place in Republika Srpska, but according to official statistical data there is no glass production in the Federation of BiH and Brčko District.

**Group 4. Category e: Ceramics production**

According to data from the Agency for Statistics of BiH, total production (activity) of ceramics in 2012 amounted to 262.18 t. In addition to this, a certain amount is also expressed in m<sup>2</sup> (680 m<sup>2</sup>), but not included in the calculation.

According to data from the Republic Institute of Statistics of RS, total production (activity) of ceramics in 2012 amounted to 64.22 t. In the Federation of BiH total production (activity) of ceramics in 2012 amounted to 197.903 t. In Brčko District 0.057 t. of ceramics were produced.

**Table 110:**  
Ceramics production in  
BiH in 2012

	RS (t)	FBiH (t)	BD (t)	BiH (t)
Ceramics production	64.2	197.9	0.06	262.2

**Group 4. Category f: Asphalt production**

According to data from the Agency for Statistics of BiH, total production (activity) of asphalt in BiH, in 2012 amounted to 3,375,387 m<sup>2</sup>, which is the equivalent of 210,962.00 t, considering that 1 t can cover an area of 16 m<sup>2</sup>. Asphalt production takes place only in the Federation of BiH. According to official data, there is no production of asphalt in Republika Srpska and Brčko District.

**Group 4. Category e: Oil shale processing**

According to official data, there is no record of oil shale processing in BiH.

Table 111 presents the data analysis of the identified categories and classes of the UNEP Toolkit (2013) for Group 4.

**Table 111:**  
Estimates of PCDD/  
PCDF releases into the  
environment from Group  
4- Production of mineral  
products

Group	Cat.	Class	Source categories				Potential Release Routes (µg TEQ/t)			
			Air	Water	Land	Products				
4			Production of Mineral Products							
	a		Cement kilns							
		2	Old wet kilns, ESP temperature >300 °C	5	ND	NA	ND			
	b		Lime							
		2	Good dust abatement	0.07	ND	NA	ND			
	c		Brick							
		1	No emission abatement in place and using contaminated fuels	0.2	NA	NA	0.06			
	d		Glass							
			Cyclone/no dust control, contaminated or poor fuels	0.07	ND	NA	ND			
	e		Ceramics							
		1	Cyclone/no dust control, contaminated or poor fuels	0.2	NA	NA	ND			
	f		Asphalt mixing							
		1	Mixing plant with no gas cleaning	0.07	NA	NA	ND			
	g		Oil shale processing							
4			Production of Mineral Products							

ND - not defined, NA - not applicable

### 2.3.6.3.5 Transport

Data for this group and its subgroups were obtained, among other sources, from:

- The publication of the Agency for Statistics of BiH "Registered motor vehicles for the year 2012",
- The publication of Republic Institute of Statistics of RS bulletin no. 6, "Transport and Communications",
- The publication of the Federal Institute of Statistics "Registered motor vehicles for the year 2012",
- Agency for Identification Documents, Registers and Data Exchange - CIPS ([www.iddeea.gov.ba](http://www.iddeea.gov.ba)) and BIHAMK - Bosnia and Herzegovina Automobile Club ([bihamk.ba/dokument/statistike/Registrovana\\_vozila\\_u\\_2012\\_godini.pdf](http://bihamk.ba/dokument/statistike/Registrovana_vozila_u_2012_godini.pdf)).

All information refers to the year 2012.

According to data from Agency for Statistics of BiH, during the year 2012, in BiH, in retail trade of motor fuels and lubricants the realized turnover amounted to 1,805,877,000 BAM. In RS, in retail trade of motor fuels and lubricants, the realized turnover amounted to 1,073,966,000 BAM, the realized turnover of motor fuels was worth 844,828,000 BAM, which accounts for 80%, all according to Republic Institute of Statistics of RS. This percentage was applied to the whole of BiH, and in this case, in retail trade of motor fuels in BiH in 2012, the realized turnover amounted to 1,444,701,600 BAM.

The PCDD/PCDF Inventory Group has not been able to obtain official data on the types and quantities (litres or tonnes) of the realized turnover in retail trade of motor fuels for the year 2012, and therefore the Group has evaluated the amounts based on the number and types of registered vehicles in 2012.

	Production			Annual release			
	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
			Air	Water	Land	Products	Residue
		845,657	4.228	0	0	0	0
	ND	845,657	4.228				
		397,802	0.028	0	0	0	0
	ND	397,802	0.028				
		212,797	0.043	0	0	0.013	0.004
	0.02	212,797	0.043			0.013	0.004
		0	0.000	0	0	0	0
	ND	2,449	0.000				
		262	0.000	0	0	0	0
	ND	262	0.000				
		210,962	0.015	0	0	0	0.000
	ND	210,962	0.015				
		0	0.000	0	0	0	0.000
			4.314	0	0	0	0.004

Registration rates in 2012 based on types of motor fuels, according to data from Agency for Statistics of BiH:

*Table 112:  
Number of registered  
vehicles in Bosnia and  
Herzegovina, based on  
the types of motor fuels*

Type of vehicle	Fuel, %	
	Diesel	Gasoline
Cars	57	43
Buses	100	0
Trucks	96	4
Other	100	0
	92	8

Considering that vehicles with bigger engines consume more fuel, the PCDD/PCDF Inventory Group has recalculated the percentages based on annual retail trade, as presented in the last row of Table 113.

The average price of fuel in the 2012 (various sources) amounted to:

- Diesel 2.34 BAM/l
- 98 octane gasoline 2.42 BAM /l
- 95 octane gasoline 2.31 BAM /l

The PCDD/PCDF Inventory Group has evaluated that the average price of fuel in 2012 was 2.34 BAM/l. Based on the foregoing, and pursuant to the guidelines of the UNEP Toolkit (2013), calculations revealed that in 2012 in the transportation sector 568,002,338 l of diesel and 49,391,508 l of gasoline were utilized. The PCDD/PCDF Inventory Group has taken the mean value of density of diesel, which is 0.85 kg/l and of gasoline, which is 0.74kg/l (source: UNEP Toolkit (2013)) and determined that in 2012 the following quantities were sold in retail trade:

- diesel 482,802 t
- gasoline 36,550 t

Source categories				Potential Release Routes (µg TEQ/t)			
Group	Cat.	Class		Air	Water	Land	Products
5			Transport				
	a		4-Stroke engines				
		2	Unleaded gasoline without catalyst	0.1	NA	NA	NA
		3	Unleaded gasoline with catalyst	0.001	NA	NA	NA
	b		2-Stroke engines				
	c		Diesel engines				
		1	Regular Diesel	0.1	NA	NA	NA
	d		Heavy oil fired engines				
5			Transport				

ND - not defined, NA - not applicable

According to data from the above-mentioned sources, in BiH 59% of the registered vehicles run on diesel fuel and 41% of them run on gasoline, which means that the total amount of fuel sold is distributed as shown below:

Fuel	RS (t)	F BiH (t)	BD (t)	BiH (t)
Diesel	179,119.5	288,232.8	14,449.7	482,802
Gasoline	13,560.0	21,820.4	1,169.6	36,550

*Table 113:  
Assessment of the  
amount of fuel sold in  
BiH in 2012*

On the basis of data on the age of vehicles and eco-features (Agency for Statistics of BiH), the PCDD/PCDF Inventory Group has determined that vehicles have catalytic converters (Group 5, category a, class 2 and 3) in the percentages, as shown in Table 114.

Type of vehicle	Catalytic converter, %	
	Have	Do not have
Cars	56	44
Buses	58	42
Trucks	60	40
Other	50	50

*Table 114:  
Percentage of vehicles  
with catalytic converters  
in BiH for 2012*

On the basis of official data, in Bosnia and Herzegovina water transport (river or sea) is not advanced. Transport vehicles with 4-Stroke engines are most commonly used<sup>85</sup>. Furthermore, based on discussions with representatives of petrol stations and distributors, the PCDD/PCDF Inventory Group has received information that leaded gasoline is no longer sold and biodiesel is not available yet, and therefore these two categories are to be disregarded.

Table 115 presents the data analysis of the identified categories and classes of the UNEP Toolkit (2013) for Group 5.

	Consumption		Annual release				
	Residue	t/a *	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
			Air	Water	Land	Products	Residue
		36,550	0.002	0	0	0	0
	NA	16,082	0.002				
	NA	20,468	0.000				
		0	0	0	0	0	0
		482,802	0.048	0	0	0	0
	ND	482,802	0.048				
		0	0	0	0	0	0
			0.050	0	0	0	0

*Table 115:  
Estimates of PCDD/  
PCDF releases into the  
environment from Group  
5-Transport*

### 2.3.6.3.6 Open burning processes

According to the UNEP Toolkit (2013), the sixth source group of dioxins and furans - open burning processes, has two categories.

For Category **6b)-Waste burning and accidental fires** the PCDD/PCDF Inventory Group has not been able to obtain data on waste burning at landfills, because it is not included in the official statistical records.

For Category **6a) under 4** there is accurate data on areas burnt and the amount of wood burnt on the territory of Republika Srpska in 2012 (Republic Institute of Statistics of RS). The data for the Federation of BiH are provided as part of the report of the Federal Department of Civil Protection "Information on accidental fires in the Federation of Bosnia and Herzegovina", from September 2012. For the other entries in the subcategory a) the PCDD/PCDF Inventory Group was not able to collect data because they relate to illegal burning of agricultural land for soil fertility, and sugarcane is not cultivated in these areas, and there are no savannahs in BiH.

The statistical data on the size of the burned forest (Federal Department of Civil Protection: "Information on accidental fires in the Federation of Bosnia and Herzegovina", September 2012; the Republic Institute of Statistics of RS - Bulletin no 13: "Forests") usually offer information about the burnt areas of the forest, but not about the quantity of burnt wood, which is necessary for the calculation. That is why the UNEP Toolkit (2013) provides specific amounts of burnt wood per area for various climate zones. For Bosnia and Herzegovina the amount for forests of the temperate belt is used:

- for fires in forests of the temperate belt: 11 t/ha is the amount of burnt wood

According to the UNEP Toolkit (2013), the provided coefficients have proven to be very precise in practice, and the PCDD/PCDF Inventory Group will use them in further calculations.

The PCDD/PCDF Inventory Group has obtained the data on this group and its subgroups from Republic Institute of Statistics of RS and Federal Department of Civil Protection. All information refers to the year 2012. According to this data, in 2012, in Republika Srpska 24 379 ha of forests in the state sector and 9 402 ha of forests in the private sector were destroyed by fires, a total of 33 781 ha, which amounts to 371 591 t of burnt wood (as recommended by the UNEP Toolkit (2013)). In the Federation of BiH 3 200 ha of forests were affected, which amounts to 35 200 t of burnt wood (recommended by the UNEP Toolkit (2013)).

*Table 116:  
Burned areas in 2012*

	RS	FBIH	BD	BiH
Burned area, ha	33,781	3,200	0	36,981
Burned forests (t)	371,591	32,200	0	406,791

According to the information received by the PCDD/PCDF Inventory Group, there is no record of forest fires in Brčko District in 2012.

Table 117 presents the data analysis of the identified categories and classes of the UNEP Toolkit (2013) for Group 6.

*Table 117:  
Estimates of PCDD/  
PCDF releases into  
the environment from  
Group 6- Open burning  
processes*

Group	Cat.	Class	Source categories		Potential Release Routes (µg TEQ/t)			
					Air	Water	Land	Products
6	a		Open Burning Processes					
			Biomass burning					
		4	Forest fires		1	ND	0.15	NA
6	b		Waste burning and accidental fires					
			Open Burning Processes					

ND - not defined, NA - not applicable

### 2.3.6.3.7 Production and use of chemicals and consumer goods

According to the UNEP Toolkit (2013), Group 7 has 8 categories, as shown in Table 118.

Categories	Air	Water	Land	Product	Residue
7a Pulp and paper production	x	x		x	x
7b Chlorinated inorganic chemicals	x	X		X	X
7c Chlorinated aliphatic chemicals (plastic)	x	X	(x)	X	X
7d Chlorinated aromatic chemicals	x	X	(x)	X	X
7e Other chlorinated and non-chlorinated chemicals	x	X	(x)	X	X
7f Petroleum industry	x				x
7g Textile industry		x		x	x
7h Leather industry		x		x	x

Table 118:  
Categories of Group 7

The PCDD/PCDF Inventory Group has obtained the data on this group from the publication of the Agency for Statistics of BiH "Industrial production in Bosnia and Herzegovina for the year 2012 – Previous PRODCOM results" and the publication of the Republic Institute of Statistics of RS – bulletin no 16: "Industrial production – Previous PRODCOM results".

#### Category 7a)

According to the UNEP Toolkit (2013) and PCDD/PCDF emissions, category 7a) pulp and paper production is divided into emissions from power plants, emissions from wastewater and based on the amount of products.

Power plants are exclusively on liquid fuels, so the emission factor for the residue is in the form of bottom ash or fly ash is ND-no data.

The manufacturing processes of the pulp and paper production are under: 7a)2, 7a)4 and 7a)8.

7a) Category: Pulp and paper production	RS (t)	FBiH (t)	BD (t)	BiH (t)
TOTAL	0	207,149	0	207,149
1 Boilers on liquid fuel	0	207,149	0	207,149
2 Power boilers fuelled with sludge and/or biomass				
3 Power boilers fuelled with wood				

Table 119:  
Category 7a) –  
Production in power  
plants

Production		Annual release					
Residue	t/a	g TEQ/a	g TEQ/ a	g TEQ/ a	g TEQ/ a	g TEQ/ a	g TEQ/ a
		Air	Water	Land	Products	Residue	
	406,791	0.407	0	0.061	0	0	
NA	406,791	0.407		0.061			
	0	0.000	0	0.000	0	0	
		0.407	0	0.061	0	0.000	

**Table 120:**  
Category 7a) -  
Production of wastewater  
from technological  
processes, and the  
amount of products

7a)	Category: Pulp and paper production	RS (t)	FBiH (t)	BD (t)	BiH (t)
	TOTAL	0	207,149	0	207,149
1	Kraft process, Cl <sub>2</sub> , non-wood, PCP contaminated fibres				
2	Kraft process, Cl <sub>2</sub>		75,313		75,313
3	Mixed technology (Cl <sub>2</sub> partially in 1st step, followed by non-chlorine bleaching)				
4	Sulphite process Cl <sub>2</sub>		119,909		119,909
5	Kraft process ClO <sub>2</sub>				
6	Sulphite process, with ClO <sub>2</sub> or totally chlorine-free (TCF)				
7	Thermo-mechanical process, lignin-saving chemical treatment				
8	Recycling papers from contaminated waste paper		11,927		11,927
9	Recycling paper from modern paper				

**Note:** According to information received by the PCDD/PCDF Inventory Group, in Republika Srpska there is no pulp and paper production and recycling of papers (paper is collected for recycling, but is not processed); there is only production of stationary paper made of imported paper. Based on the same information, there is no production of paper or paper products in Brčko District.

#### Category 7b)-7e)

The PCDD/PCDF Inventory Group was unable to obtain official data for this category. The Agency for Statistics of BiH does not mention the quantities of the produced or consumed chemicals in the publication "Industrial production in Bosnia and Herzegovina for the year 2012 – Previous PRODCOM results", under the categories Disinfecting agents, Pesticides and agrochemical production and other. Chlorine compounds and elemental chlorine are not mentioned either.

#### Category 7f)

According to the UNEP Toolkit (2013), this subcategory deals with emissions from flares during oil processing and the emission factor depends on the quantity of heat. Furthermore, it involves emissions from catalytic reforming unit, coking process and from oil processing wastewater.

In BiH there is only one oil refinery, located in Brod, Republika Srpska.

In the publication "Industrial production in Bosnia and Herzegovina for the year 2012 – Previous PRODCOM results" The Agency for Statistics of BiH provides the quantity of products obtained by coking and oil processing, which is 144,526 t. However, the PCDD/PCDF Inventory Group needs the data on the quantity of residues, in other words, the amount

Source categories			Potential Release Routes (µg TEQ/t)			
Cat.	Group	Cat.	Class	Air	Water	
		Production and Use of Chemicals and Consumer Goods				
a		Pulp and paper mills *				
		Boilers (per ton Adt pulp)				
	1	Recovery boilers fuelled with black liquor	0.03			
		Aqueous discharges and products				
	2	Kraft process, old technology (Cl <sub>2</sub> )		4.5		10
	4	Sulphite pulp/papers, old technology		ND		1
	8	Recycling papers from contaminated waste papers		ND		10
b		Chlorinated Inorganic Chemicals				
c		Chlorinated Aliphatic Chemicals				
d		Chlorinated Aromatic Chemicals (per ton product)				
e		Other Chlorinated and Non-Chlorinated Chemical (per ton product)				
f		Petroleum refining				
		Production processes (per ton oil)				
	2	Coking unit	0.4	NA	NA	NA
g		Textile plants (per ton textile)				
	1	Low-End Technologies	ND	ND	ND	100
h		Leather plants				
	1	Low-End Technologies	NA	ND	ND	1,000
		Chemicals and Consumer Goods				

ND - not defined, NA - not applicable



of generated wastewater, in order to calculate the emissions from catalytic reforming unit and wastewater treatment, but there are no statistical data on this matter, and no response was received from the Oil Refinery Brod.

### Category 7g)

The quantities of various types of fabric, spun or otherwise obtained in the year 2012, are provided in the publication of The Agency for Statistics of BiH "Industrial production in Bosnia and Herzegovina for the year 2012 – Previous PRODCOM results", the publication of the Federal Institute of Statistics - statistical bulletin 191: "Industrial production in the Federation of Bosnia and Herzegovina" and the publication of the Republic Institute of Statistics of RS-bulletin no 16: "Industrial production – Previous PRODCOM results", in the section "Textile production", and the values presented are all identical. According to the UNEP Toolkit (2013), dioxin and furan emissions are calculated based on the level of development of the technological process of textile manufacturing. Table 121 presents the data obtained from the above-mentioned institutions.

7g)	Category: textile production	RS (t)	FBiH (t)	BD (t)	BiH (t)
	TOTAL	7,178	0	0	7,178
1.	Low-end technologies	7,178	0	0	7,178
2.	Mid-range technologies, non-BAT	0	0	0	0
3.	High-end technologies, BAT	0	0	0	0

Table 121:  
Category 7g) - Textile production

### Category 7h)

According to the publication of The Agency for Statistics of BiH "Industrial production in Bosnia and Herzegovina for the year 2012 – Previous PRODCOM results" and the publication of the Federal Institute of Statistics - statistical bulletin 191: "Industrial production in the Federation of Bosnia and Herzegovina" a quantity of 103 t of leather was processed in Bosnia and Herzegovina in 2012. Table 122 presents the data obtained from the above-mentioned institutions.

7g)	Category: leather production	RS (t)	FBiH (t)	BD (t)	BiH (t)
	TOTAL	0	103	0	103
1.	Low-end technologies	0	0	0	0
2.	Mid-range technologies, non-BAT	0	103	0	103
				0	

Table 122:  
Category 7g) - Leather production

Table 123 presents the data analysis of the identified categories and classes of the UNEP Toolkit (2013) for Group 7.

	Production			Annual release			
	Land	Products	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a
			Air	Water	Land	Products	Residue
				0.3	0.0	1.0	0.3
		207,149	0.006				
	ND	207,149	0.006				
		207,149		0.339		0.992	0.339
	4.5	75,313		0.339		0.753	0.339
	ND	119,909				0.120	
		11,927				0.119	
		144,526	0.058				
	ND	144,526	0.058				
		7,178				0.7	
	ND	7,178				0.718	
		103				0.1	
	ND	103				0.103	
			0.064	0.339	0.000	1.813	0.339

Table 123:  
Estimates of PCDD/  
PCDF releases into the  
environment from Group  
7-Production and use of  
chemicals and consumer  
goods

### 2.3.6.3.8 Miscellaneous

The PCDD/PCDF Inventory Group obtained the data for this group and its categories and classes from the publication of the Agency for Statistics of BiH: "Industrial Production in Bosnia and Herzegovina for 2012 - Previous PRODCOM Results", the publication of the Republic Institute of Statistics of RS - Bulletin No. 16: "Industrial Production - Previous PRODCOM Results", and various internet sites. Statistical data refer to the year 2012.

**Note:** Data for the Federation of Bosnia and Herzegovina were obtained by calculation of the difference in the statistical values provided by these two publications.

Table 124:  
Group 8 categories

Group 8	Categories
a)	Drying of biomass
b)	Cremation
c)	Smoke houses
d)	Dry cleaning
e)	Tobacco smoking

#### Category 8a)

According to the publication of the Agency for Statistics of BiH: "Industrial Production in Bosnia and Herzegovina for the year 2012 - Previous PRODCOM Results" and the publication of the Republic Institute of Statistics of RS, Bulletin No. 16: "Industrial Production - Previous PRODCOM Results", 6,677 m<sup>3</sup> of biomass was dried in the year 2012. The publications do not provide data on the types of wood. The density of dried deciduous wood is app. 800 kg/m<sup>3</sup> and app. 600 kg/m<sup>3</sup> for dried evergreen wood<sup>88</sup>. According to available information, the PCDD/PCDF Inventory Group used the mean density value of 700 kg/m<sup>3</sup> and calculated that 4,674 t of wood was dried in 2012.

Since these are mostly recently manufactured large dryers, the PCDD/PCDF Inventory Group has assumed, on the basis of obtained data, that they belong to class 2, i.e. that moderately contaminated fuels are being used for drying of biomass.

According to the publication of the Federal Institute of Statistics - Statistical Bulletin 191: "Industrial Production in the Federation of Bosnia and Herzegovina" and the publication of the Agency for Statistics of BiH: "Industrial Production in Bosnia and Herzegovina for the year 2012 - Previous PRODCOM Results", there were no activities related to drying of biomass in the Federation of Bosnia and Herzegovina and Brčko District.

#### Category 8b)

Based on official data, until mid-2009, there were officially no crematoria and no officially conducted cremation activities in BiH. For this category, the PCDD/PCDF Inventory Group was unable to obtain any official data.

Source category			Potential release route (µg TEQ/t)			
Group	Cat.	Class	Air	Water	Land	Product
8		Miscellaneous				
	a	Drying of biomass				
		2 Moderately contaminated fuel	0.1	NA	ND	0.1
	b	Crematoria				
	c	Smoke houses				
		2 Clean fuels, no afterburner	6	NA	ND	ND
	d	Dry cleaning				
	e	Tobacco smoking				
		2 Cigarette (per million items)	0.1	NA	NA	NA
8		Miscellaneous				

ND - not defined, NA - not applicable

<sup>88</sup> Source: [http://info.grad.hr/res/gf\\_osoblje/1033378314/doc/300.svojtva\\_drva.pdf](http://info.grad.hr/res/gf_osoblje/1033378314/doc/300.svojtva_drva.pdf)

**Category 8c)**

According to the publication of the Agency for Statistics of BiH: "Industrial Production in Bosnia and Herzegovina for the year 2012 - Previous PRODCOM Results", 1,890 tons of various types of meat were smoked in 2012. According to the publication of the Republic Institute of Statistics of RS - Bulletin No. 16: "Industrial Production – Previous PRODCOM Results", 1 505.6 t of meat were smoked in Republika Srpska. According to the publication of the Federal Institute of Statistics - Statistical Bulletin 191: "Industrial Production in the Federation of Bosnia and Herzegovina", 339.6 tons of various types of meat were smoked in the Federation of BiH. The PCDD/PCDF Inventory Group calculated that 44.8 t of various types of meat were smoked in Brčko District. These data do not cover individual small smoke houses active in the winter months, due to the fact that there are no official data for such smoke houses.

According to obtained data, small amounts of wood are mainly used for smoking meat without any subsequent treatment of off-gases.

**Category 8d)**

Dry cleaners in BiH are artisanal facilities with 5 – 10 employees. The PCDD/PCDF Inventory Group was unable to obtain any statistical data in terms of the quantities and types of cleaned items, the consumption of chemicals for cleaning, etc. Requests for data were sent to the Agency for Statistics of BiH, the statistical institutes in FBiH and RS, as well as public utility companies.

**Category 8e)**

According to the publication of the Agency for Statistics of BiH: "Industrial Production in Bosnia and Herzegovina for the year 2012 - Previous PRODCOM Results", 3,246 tons of tobacco were used for the purpose of cigar and cigarette production in 2012. According to the publication of the Republic Institute of Statistics of RS - Bulletin No. 16: "Industrial Production-Previous PRODCOM Results", 253 t of tobacco were used for the purpose of cigar and cigarette production. According to the publication of the Federal Institute of Statistics - Statistical Bulletin 191: "Industrial Production in the Federation of Bosnia and Herzegovina", 2,993 t of tobacco was used for the purpose of cigar and cigarette production. According to the reports published by the Agency for Statistics of Bosnia and Herzegovina, there were no registered activities related to cigarette production in Brčko District.

	RS (t)	F BiH (t)	BD (t)	BiH (t)
Tobacco used for cigarette production	253	2,993	0	3,246

*Table 125:  
Tobacco used for  
cigarette production in  
BiH in 2012*

Based on official data, smoking cigars (cigarillos) is not practiced in Bosnia and Herzegovina, and the PCDD/PCDF Inventory Group was unable to obtain such data; thus, for the purposes of this calculation, it can be assumed that all of the tobacco was used for cigarette production.

Table 126 presents the data analysis of the identified categories and classes of the UNEP Toolkit (2013) for Group 8.

	Production		Annual release				
	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
			Air	Water	Land	Product	Residue
		4,674	0.000	0	0	0.000	0.093
20		4,674	0.000			0.000	0.093
		0	0.000	0	0	0	0.000
		1,890	0.011	0	0	0	0.038
20		1,890	0.011				0.038
		0	0	0	0	0	0.000
		3,246	0.0003	0	0	0	0.00032
0.1		3,246	0.000				0.000
			0.012	0	0	0.000	0.132

*Table 126:  
Estimates of PCDD/  
PCDF releases into the  
environment from Group  
8-Miscellaneous*

### 2.3.6.3.9 Waste disposal

According to the UNEP Toolkit (2013), this group includes the following categories:

*Table 127:  
Group 9 categories*

Group 9	Categories
a)	Landfills, waste dumps and landfill mining
b)	Sludge / sludge treatment
c)	Open water dumping
d)	Composting
e)	Waste oil disposal

#### Category 9a)

According to the UNEP Toolkit (2013), this category has three classes of landfills: hazardous waste landfills, mixed (domestic and industrial) waste landfills and domestic waste landfills.

In BiH, the data for hazardous waste landfills are not processed statistically. According to the obtained data from the applications for environmental permits in FBiH, RS and BD, these landfills are most commonly found within factories or mines where waste is generated. Tailings are mainly disposed of at disused open pits. The PCDD/PCDF Inventory Group was unable to obtain data for this class or any information about the existence of exact records.

Data on domestic waste landfills and mixed waste landfills are taken from the publications "Produced, Collected and Dumped Waste" for the year 2012 for Republika Srpska (Republic Institute of Statistics of RS) and "Collected and Dumped Domestic Waste in 2012" for the Federation of Bosnia and Herzegovina (Federal Institute of Statistics). Data on collected quantities of mixed and domestic waste are given in Table 128.

*Table 128:  
Quantities of mixed and domestic waste collected*

Class	RS (t)	F BiH (t)	BD (t)	Total per class (t)
Mixed waste	43,175	121,225	0	164,400
Domestic waste	241,795	567,910	493,161	1,302,866
Total per entity	284,970	689,135	493,161	

On the territory of Brčko District, there is one mixed waste and domestic waste landfill for which the PCDD/PCDF Inventory Group was unable to obtain statistical data. The quantities of domestic waste were calculated on the basis of differences between the data provided by the Agency for Statistics of Bosnia and Herzegovina and the entity level institutes of statistics.

#### Category 9b)

In Republika Srpska, according to the publications "Public Sewage System" and "Use and Protection of Waters Against Industrial Pollution" published by the Republic Institute of Statistics of RS, the following quantities of wastewaters were treated in the year 2012:

*Table 129:  
Quantities of treated wastewaters in RS*

RS	Total waste waters, m <sup>3</sup>	Treated, m <sup>3</sup>	% of treated waters
Sewage waters	30,299,000	1,109,000	3.66
Industrial wastewaters	20,546,000	17,206,000	83.74
Total	50,845,000	18,315,000	36.02

In the Federation of Bosnia and Herzegovina, according to the publications "Wastewater Treatment and Release in 2012" and "Use and Protection of Waters Against Industrial Pollution in 2012", published by the Federal Institute of Statistics, the following quantities of wastewaters were treated in the year 2012:

*Table 130:  
Quantities of treated wastewaters in FBiH*

F BiH	Total waste waters, m <sup>3</sup>	Treated, m <sup>3</sup>	% of treated waters
Sewage waters	64,707,000	3,028,000	4.68
Industrial wastewaters	68,319,000	38,946,000	57.0
Total	133,026,000	41,974,000	31.6

The PCDD/PCDF Inventory Group was unable to obtain data on the quantities of separated sludge, its treatment and permanent disposal methods. In addition, there are no data for Brčko District.

#### Category 9c)

In Republika Srpska, according to the publications “Public Sewage System” and “Use and Protection of Waters Against Industrial Pollution” published by the Republic Institute of Statistics of RS, the following quantities of untreated municipal and industrial waters were released into waters in the environment:

RS	Untreated municipal waters, m <sup>3</sup>	Untreated industrial waters, m <sup>3</sup>	Total, m <sup>3</sup>
Into groundwaters	2,148,000	509,000	2,657,000
Into watercourses	25,855,000	2,831,000	28,686,000
Into lakes/reservoirs	0	0	0
<b>Total, m<sup>3</sup></b>	<b>28,003,000</b>	<b>3,340,000</b>	<b>31,343,000</b>

*Table 131:  
Quantities of untreated municipal and industrial waters released into the environment in RS*

In the Federation of Bosnia and Herzegovina, according to the publications “Wastewater Treatment and Release in 2012” and “Use and Protection of Waters Against Industrial Pollution in 2012”, published by the Federal Institute of Statistics, the following quantities of untreated municipal and industrial waters were released into waters in the environment:

F BiH	Untreated municipal waters, m <sup>3</sup>	Untreated industrial waters, m <sup>3</sup>	Total, m <sup>3</sup>
Into groundwaters	1,817,000	0	1,817,000
Into watercourses	59,432,000	19,069,000	78,501,000
Into lakes/reservoirs	430,000	0	430,000
<b>Total, m<sup>3</sup></b>	<b>61,679,000</b>	<b>19,069,000</b>	<b>80,748,000</b>

*Table 132:  
Quantities of untreated municipal and industrial waters released into the environment in FBiH*

On the territory of Brčko District, there is a city sewage system in the central parts of the city of Brčko, and the waters from this system are released into the river Sava, the bordering river with the Republic of Croatia. The PCDD/PCDF Inventory Group was unable to obtain data on the amount of waters released.

In addition, the PCDD/PCDF Inventory Group was unable to obtain data on the release of wastewaters by individual country houses, as well on industrial waters from small-scale manufacturing activities for the entire territory of BiH.

#### Category 9d)

The PCDD/PCDF Inventory Group was unable to obtain data on the process of composting in Bosnia and Herzegovina.

#### Category 9e)

In the entities, there are businesses dealing with the purchase and non-thermal disposal (mainly through the collection and export) of waste oils. The PCDD/PCDF Inventory Group has not yet received all the individual data for the entities and BD, and will revise the calculations in the event these data are obtained.

Table 133 presents the data analysis of the identified categories and classes of the UNEP Toolkit (2013) for Group 9.

**Table 133:**  
Estimates of PCDD/  
PCDF releases into the  
environment from Group  
9-Waste disposal

Group	Cat.	Class	Source category	Potential release route (µg TEQ/t)			
				Air	Water	Land	Product
9			Waste disposal				
	a		Landfills, waste dumps and landfill mining				
		2	Mixed wastes	NA	0.5	NA	NA
		3	Domestic wastes	NA	0.05	NA	NA
	b		Sludge/sludge treatment				
	c		Open water dumping				
		1	Mixed domestic and industrial wastes	NA	0.005	NA	NA
	d		Composting				
	e		Waste oil disposal				
9			Disposal/Landfill				

ND - not defined, NA - not applicable

### 2.3.6.3.10 Total estimates of PCDD/PCDF releases into the environment

Table 134 shows the total estimates of PCDD/PCDF releases into the environment in BiH for the year 2012.

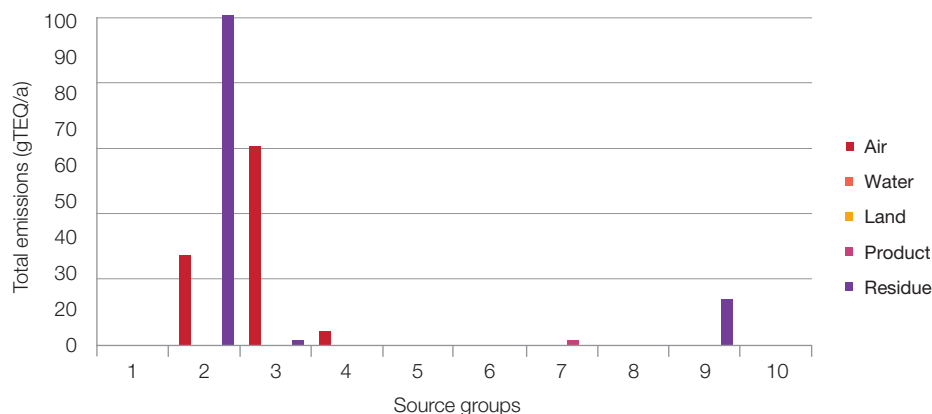
**Table 134:**  
Total estimates of PCDD/  
PCDF releases into the  
environment for the year  
2012 in BiH

Group	Source groups	Total emissions (g TEQ/a)				
		Air	Water	Land	Product	Residue
1	Waste Incineration	0.1	0.0	0.0	0.0	0.0
2	Ferrous and Non-Ferrous Metal Production	27.6	0.0	0.0	0.0	101.0
3	Heat and Power Generation	61.0	0.0	0.0	0.0	1.9
4	Production of Mineral Products	4.3	0.0	0.0	0.0	0.0
5	Transportation	0.0	0.0	0.0	0.0	0.0
6	Open Burning Processes	0.4	0.0	0.1	0.0	0.0
7	Production and Use of Chemicals	0.1	0.3	0.0	1.8	0.3
8	Miscellaneous	0.0	0.0	0.0	0.0	0.1
9	Waste disposal	0.0	0.1	0.0	0.0	14.7
10	Identification of Potential Hotspots				0.0	0.0
1-10	Total	93.5	0.5	0.1	1.8	118.2
	Grand total					214.1

The most significant routes of PCDD/PCDF release is to residue/waste (55.23%), followed by air emissions (43.69%), and the rest (1.08%) is incorporated in products (during the production of chemicals and consumer goods) and deposited in water and soil.

Unintentionally produced POPs mostly occur from waste generated during ferrous and non-ferrous metal production (65.45%), and the most are concentrated as residues (12.44%). Releases of unintentionally produced POPs into air mostly occur due to heat and power generation (65.24%), followed by ferrous and non-ferrous metal production (29.52%).

**Figure 26:**  
Total estimates of PCDD/  
PCDF releases into the  
environment for the year  
2012 in BiH



	Production		Annual release				
	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
			Air	Water	Land	Product	Residue
		1,467,266		0.147			14.734
	50	164,400		0.082			8.220
	5	1,302,866		0.065			6.514
		112,018,000					
	NA	112,018,000					
				0.147			14.73433

Table 135 shows the result of the PCDD/PCDF inventory in 2012 for Bosnia and Herzegovina, and Table 136, Table 137 and Table 138 the results of the inventory by Entities.

PCDD/PCDF releases in 2012 (g TEQ/a)				
Air	Water	Land	Product	Residue
93,5	0,5	0,1	1,8	118,2

*Table 135:  
Results of PCDD/PCDF  
inventory (the year 2012)  
for BiH*

PCDD/PCDF releases in 2012 (g TEQ/a)				
Air	Water	Land	Product	Residue
42,4	0,5	0,0	1,0	114,7

*Table 136:  
Results of PCDD/PCDF  
inventory (the year 2012)  
for FBiH*

PCDD/PCDF releases in 2012 (g TEQ/a)				
Air	Water	Land	Product	Residue
20,7	0,0	0,0	0,7	4,1

*Table 137:  
Results of PCDD/PCDF  
inventory (the year 2012)  
for RS*

PCDD/PCDF releases in 2012 (g TEQ/a)				
Air	Water	Land	Product	Residue
0,5	0,0	0,1	0,0	0,2

*Table 138:  
Results of PCDD/PCDF  
inventory (the year 2012)  
for BD*

In order to assess PCDD/PCDF, the PCDD/PCDF Inventory Group used available data obtained from institutions engaged in statistics at entity and state level. During the development of the inventory of unintentionally produced POPs in BiH, the PCDD/PCDF Inventory Group noted that the representatives of the industry have little knowledge of the problems caused by unintentionally released POPs. Based on analysis of data obtained, the PCDD/PCDF Inventory Group concluded that the following economic entities are potentially responsible for emissions of unintentionally produced POPs:

- ArcelorMittal Zenica
- Steel foundry Tuzla
- Birač Zvornik
- Boksit Milići
- Jajce Alloy Wheels Jajce
- Thermal power plant Kakanj
- Thermal power plant Ugljevik
- Thermal power plant Gacko
- Thermal power plant Tuzla

### 2.3.6.4 Potentially contaminated areas and hot-spots

In accordance with the UNEP Toolkit (2013), which sets out criteria for the identification of contaminated areas and hot spots, and lists the source groups that should be considered when setting priorities for establishing inventories and assessing sites potentially contaminated with PCDD/PCDF and other unintentional POPs, as well as (historic) stockpiles of contaminated wastes<sup>89</sup>, PCDD/PCDF Inventory Group has identified potential hot spots in Bosnia and Herzegovina.

Criteria for identification of potential hot spots:

- Production sites of PCDD/PCDF precursors<sup>90</sup> (e.g. chlorophenols, chlorinated pesticides, PCB) or HCB precursors (e.g. perchlorethene, trichloroethene, tetrachlormethane);
- Factories having used elemental chlorine in production processes (e.g. magnesium production, or pulp and paper production) with high PCDD/PCDF releases often in solids/sludges or to water, including related contaminated sediments;
- Use or application sites of organochlorine compounds known to contain PCDD/PCDF or having PCDD/PCDF precursor potential (production sites of PCB-filled equipment, PCP use in wood preservation, application areas of pesticides containing PCDD/PCDF);
- End-of-life storage and disposal/dumping sites of organochlorine compounds known to contain PCDD/PCDF or having PCDD/PCDF precursor potential (obsolete pesticide storage/burial, PCB storage);
- Thermal sources with high historic releases of PCDD/PCDF to air, water or wastes and related contamination;
- Accidents including fires with liquids and other materials polluted with PCDD/PCDF (often taking place at sources mentioned above).

Given that, as outlined in the UNEP Toolkit (2013), the monitoring of these sites is usually carried out before the inventory a listing of contaminated sites is therefore prepared based only on information on historic activities having likely resulted in high releases of PCDD/PCDF and other unintentional POPs over the last century. Consequently, in the initial stage of inventory development, the sites related to the above listed high priority activities can be categorized without a detailed assessment as “potentially polluted sites”.

In accordance with the mentioned guidelines, the PCDD/PCDF Inventory Group analysed the following documentation:

- Project documentation of the chlor-alkali industry in Tuzla
- The Environmental Impact Study for the project of decommissioning the plants: sodium-chlorate plant, electrolysis plant, salt refinery and calcium hypochlorite plant - ORGANIKA BH d.o.o. in Tuzla (Enova, Sarajevo, March 2013)
- The Environmental Impact Study for industrial, medical and other hazardous wastes in Bosnia and Herzegovina (Bosna-S, Sarajevo, March 2002)
- Presentations from the Workshop on substances on the list of the Stockholm Convention (POPs) in Bosnia and Herzegovina, organized in November 2013 by the Faculty of Pharmacy of the University of Sarajevo, the Faculty of Agriculture of the University of Banja Luka and the Norwegian Water Research Institute

In accordance with the guidelines provided by the UNEP Toolkit (2013), the PCDD/PCDF Inventory Group has characterized the sites listed below as potentially contaminated areas; however, further exploration is necessary in order to verify the contamination of these sites, as part of another project or in the course of the following inventory audit.

#### 2.3.6.4.1 Chlorine production

In the production of chlorine using graphite anodes, the residual graphite is contaminated with PCDF, PCN and other chlorinated PAH, due to the reaction between chlorine and binders.

The media into which pollution is transferred as a result of this manufacturing process include soil and, in the case of accidents, sediments of nearby waterways. High mercury concentrations are an indicator of PCDD/PCDF contamination (UNEP Toolkit 2013).

In November 2013, the PCDD/PCDF Inventory Group conducted a field visit to the former chlor-alkali complex in Tuzla. During the visit, the PCDD/PCDF Inventory Group found that the entire complex is in ruinous condition, and that the equipment that was used in the production process has been removed. The Group was unable to ascertain, following a discussion with a representative of the company, how and where the equipment had been removed.

<sup>89</sup> The list is established according to the life cycle of chlorine and organochlorine compounds.

<sup>90</sup> A compound that participates in a chemical reaction which produces a second compound.



By means of analysing the project documentation of the chlor-alkali complex in Tuzla, the PCDD/PCDF Inventory Group found that the waste waters from the former technological process are contaminated with inorganic salts treated for the purpose of removing mercury, active chlorine and other heavy metals. Process waters contaminated with active chlorine were found in the sodium chlorate and calcium hypochlorite plants. They were collected through internal sewer systems and pumped from the sodium chlorate plant into the collecting basin, and from the calcium hypochlorite plant into the salt processing plant where they were used in brine preparation. These waters were subjected to automatic chemical control, and, if found to contain contaminants above the permissible limits of the then legislation (SFRY)<sup>91</sup>, treated in a mercury treatment device. Otherwise, they were pumped into the equalization tank within the plant, and subsequently released into the nearest natural recipient, the river Jala.

The main part of this complex, the electrolysis plant, is now partially destroyed, and the equipment from the manufacturing process has been removed. Along the plant's board and gutters, there is spilled mercury, as well as about a hundred pieces of plastic barrels, weighing about 100 kg, filled with a mixture of mercury, soil and other unknown substances.

Chlorine tanks are present at the site; however, inlets have been cut off, and the PCDD/PCDF Inventory Group was unable to determine whether and how much chlorine is present in these reservoirs. The Group does not know whether any measurements for PCDD/PCDF presence were conducted at the location of the former chlor-alkali complex in Tuzla.

The Environmental Impact Study for the project of decommissioning of the plants: sodium chlorate plant, electrolysis plant, salt processing plant and calcium hypochlorite - ORGANIKA BH d.o.o. in Tuzla (Enova, Sarajevo, March 2013) mentions that analyses of land quality at the plant complex were conducted on two occasions (Table 139). The results of these analyses showed that there are certain amounts of heavy metals in the deep layers of the earth, and no other contaminants. Contamination of surface layers of soil along the electrolysis plant is exceptionally high compared to the reference values. The highest concentration of mercury was recorded in the immediate vicinity of the electrolysis plant – at the front of the facility, amounting to 3,864 mg/kg of dry matter.

Period of analyses	Name of institution conducting the analyses	Types of conducted analyses	Analysed parameters	Analyses results	Reference values <sup>92</sup>
September 2013	"Kancelaria - Srodowska sp. zoo" Poland	12 drillings of 0.5 m to 5.8 m depth (38.7 m in total) with 17 samples	<ul style="list-style-type: none"> <li>▪ Heavy metals (lead, copper, nickel, cadmium, chromium and mercury),</li> <li>▪ Chloride ion,</li> <li>▪ Oil substances (total hydrocarbons, „petrol“ C6 – C12, „oils“ &gt;C12),</li> <li>▪ Aromatic substances (total BTX, benzene, toluene, ethylbenzene xylene),</li> <li>▪ Polycyclic aromatic hydrocarbons– WWA,</li> <li>▪ Isocyanates,</li> <li>▪ Polyglycols,</li> <li>▪ PCB</li> </ul>	<ul style="list-style-type: none"> <li>▪ In the deep layers of soil, the following quantities of heavy metals (mg/kg of dry matter) were found in all the samples collected from 12 drillings, whose values vary depending on the depth of sampling:</li> <li>▪ lead: 30.1 – 63.2 mg/kg</li> <li>▪ copper: 16.5 – 28.9 mg/kg</li> <li>▪ nickel: 12.1 – 26.3 mg/kg</li> <li>▪ cadmium: 0.51 – 0.66 mg/kg</li> <li>▪ chromium: 17.1 – 32.7 mg/kg</li> <li>▪ mercury: 0.41 – 0.51 mg/kg</li> </ul>	<p><b>Germany</b> (industrial and commercial areas) – mg/kg:</p> <ul style="list-style-type: none"> <li>▪ lead: 2,000</li> <li>▪ cadmium: 60</li> <li>▪ nickel: 900</li> <li>▪ chromium: 1,000</li> <li>▪ mercury: 80</li> </ul> <p><b>Netherlands</b> (intervention value<sup>93</sup>) – mg/kg:</p> <ul style="list-style-type: none"> <li>▪ lead: 530</li> <li>▪ cadmium: 12</li> <li>▪ nickel: 210</li> <li>▪ chromium: 380</li> <li>▪ mercury: 10</li> <li>▪ zinc: 720</li> <li>▪ cobalt: 240</li> <li>▪ copper: 190</li> <li>▪ arsenic: 55</li> <li>▪ total PAH: 40</li> </ul>
February 2013	Metallurgical Institute "Kemal Kapetanović", Zenica, BiH	5 soil samples at the depths of 15 to 20 cm	<ul style="list-style-type: none"> <li>▪ pH (in the water of "slurried sample")</li> <li>▪ mercury</li> <li>▪ sulphates</li> <li>▪ chlorides</li> <li>▪ ΣS</li> </ul>	<ul style="list-style-type: none"> <li>▪ Content (g/kg of dry matter), depending on the sample</li> <li>▪ pH (in the water of "slurried sample"): 7.2 – 7.5</li> <li>▪ mercury: 0.084 – 3.864</li> <li>▪ sulphates: 1.08 – 3.80</li> <li>▪ chlorides &lt;0.01 in all samples</li> <li>▪ ΣS: 0.08 – 0.11</li> </ul>	

**Table 139:**  
Results of analyses of land within the chlor-alkali complex in Tuzla (Enova, 2013)

<sup>91</sup> The project documentation does not state the limit values.

<sup>92</sup> In FBiH, there are no laws regulating the limit values of heavy metal concentrations in industrial land; the limit values mentioned here have been taken from the Environmental Impact Study for the project of decommissioning of the plants: sodium chlorate plant, electrolysis plant, salt processing plant and calcium hypochlorite - ORGANIKA BH d.o.o. in Tuzla (Enova, Sarajevo, March 2013). There is an Instruction on Determining the Permissible Amounts of Harmful and Hazardous Substances in Soil and Methods of Testing (Official Gazette of FBiH, no. 72/09), which prescribes the limit values for metals, inorganic compounds and PAH in agricultural soil.

<sup>93</sup> The concentration of each pollutant parameter reaches a value that has a harmful effect on humans, plants and animals. Concentrations exceeding the intervention value imply heavily polluted soil, and remediation is necessary.

#### 2.3.6.4.2 Relationship between the use of PCB and occurrence of PCDF

The use of PCBs in industry, open application and leaks from equipment, leads to occurrence of locations and hot-spots contaminated with PCDF and PCB –like dioxins. PCDF emissions are estimated based the amount of PCB leaked. With the increasing age of the equipment, PCDF concentrations in equipment fillings increase, and in the case of high thermal stress (fire event, short circuit) PCDF becomes the main toxicity contributor of PCB (UNEP Toolkit 2013).

The basis for assessing potential contaminated sites and hot-spots resulting from the use of PCBs was the inventory of PCBs in BiH which was, within the inventory of POPs in BiH, undertaken by the PCB inventory group in accordance with Annex A, Part II of the Stockholm Convention.

During the period of undertaking the inventory of PCBs, in the period from June to December 2013, the PCB inventory group could not obtain complete data on the types of dielectric fluid that is used as filling in transformers and capacitors, which is the basis for calculating the amount of PCDF and dioxin-like PCDD, and therefore, according to UNEP Toolkit 2013, all sites that were the subject of the PCB inventory group, and where the presence of PCBs and PCB containing equipment was determined by the group, are assumed to be potentially contaminated sites.

Detailed inventory of PCBs is presented in *Chapter 2.3.2 Preliminary inventory of PCBs*.

#### 2.3.6.4.3 Potentially contaminated areas and hotspots identified in BiH

The PCDD/PCDF Inventory Group, in collaboration with the PCB Inventory Group, the Environment, Health, Research and Development Group and the POPs Pesticides Inventory Group, on the basis of an analysis of the documents listed at the beginning of this Chapter, and in accordance with the guidelines provided by the UNEP Toolkit (2013), identified the following locations (Table 140) as potential hotspots.

*Table 140:*  
*Identified contaminated*  
*areas and hotspots in*  
*BiH*

No.	Category of pollution source according to UNEP Toolkit 2013	Name of plant/site	Production process/waste
1	a	Organika BH d.o.o. (former chlor-alkali complex)	Sodium chloride (NaCl) electrolysis according to the Castner – Keller process with the use of mercury with a high degree of purity
2	b	“Petroleum Refinery” a.d.	Sludge lake
3	b	“Oil Refinery Modriča” a.d.	Sludge lake
4	c	Locations listed by the POPs Pesticides Inventory Group in the Chapter Preliminary inventory of POPs pesticides	Chapter 2.3.1: Preliminary inventory of POPs pesticides
5	e	KTK <sup>94</sup> Visoko d.d.	Textile and leather factory / landfill within the factory complex
6	f	“Energoinvest” Switchgear a.d.	Factory for production of medium and high voltage equipment
7	f	Locations at which the PCB Inventory Group found the presence of PCBs or PCB containing equipment	Chapter 2.3.2: Preliminary inventory of PCBs
8	g	Former industrial complex Incel, Banja Luka	Cellulose factory
9	i	Arcelor Mittal d.o.o. Zenica	Ironworks/ industrial waste landfill Rača
10	i	Alumina d.o.o.	Alumina, hydrate, zeolite and water glass factory / landfill Petkovci Zvornik
11	i	Aluminij d.d.	Aluminium factory / red mud landfill Bačevići Mostar
12	i	SASE a.d. lead and zinc mine Srebrenica (in bankruptcy)	Lead and zinc mine
13	i	DP <sup>95</sup> “Lead, zinc and barite mine” Vareš	Lead, zinc and barite mine
14	k	Locations listed by the Environment, Health, Research and Development Group in the Chapter covering POPs substances in the environment	Chapter 2.3.14 Identification of segments of population and the environment negatively impacted by POPs
15	l	Lijevče Field	Illegal landfills in gravel pits

94 Leather-textile conglomerate

95 State owned enterprise

Figure 27 shows the identified contaminated areas and hot-spots in BiH.

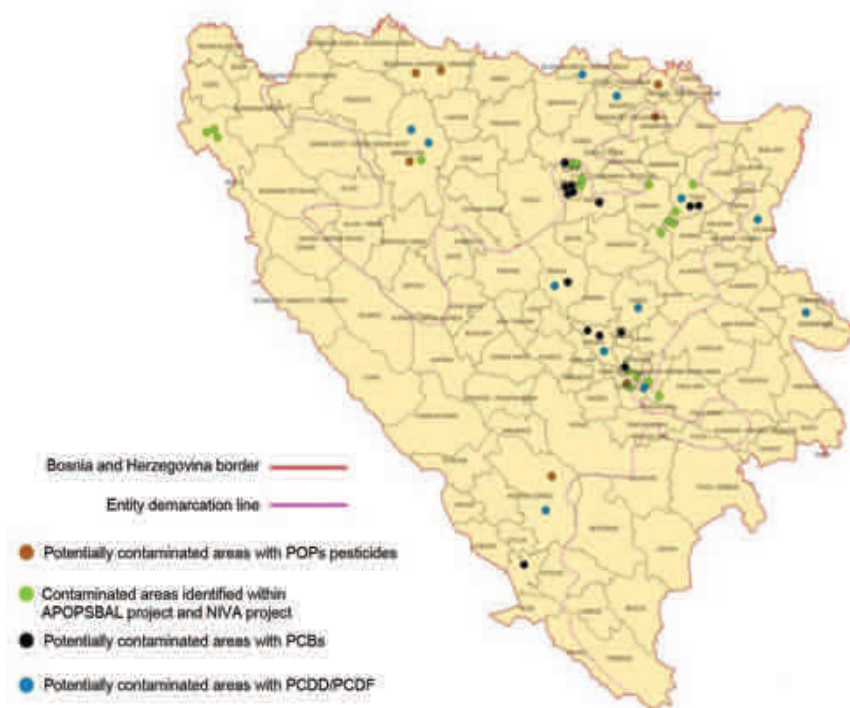


Figure 27:  
Identified contaminated  
areas and hot-spots in  
Bosnia and Herzegovina

Location	Annual activities/quantities	Remark
Industrial Zone of the City of Tuzla – Bukinje (FBiH)	<ul style="list-style-type: none"> <li>Gas chlorine 36.000 t/g</li> <li>Liquid chlorine 34.500 t/g</li> <li>Sodium hydroxide (100 %) 41.100 t/g</li> <li>Hydrochloric acid (33 %) 18.300 t/g</li> <li>Sodium hypochlorite 2.400 t/g</li> <li>Hydrogen (by-product) 1.015 t/g</li> </ul>	The manufacturing process was terminated in 1992 and has not been relaunched
Brod (RS)	Unknown	
Modriča (RS)	Unknown	
Visoko (FBiH)	Tanned leather chips, sludge from leather processing of app. 9.000 m <sup>3</sup> disposed of at a site within the factory complex	The landfill was active until the beginning of war; waste is not disposed of at the landfill anymore
Istočno Sarajevo (RS)	Unknown	
Banja Luka (RS)	Unknown	The factory is no longer in operation
Zenica (FBiH)	Until 1992.: app. 20.000.000 tonnes of industrial waste in total Annual quantities of industrial waste since 2010: app. 370.000 t/g	Industrial waste that is disposed of at this landfill includes waste from blast furnaces, steel mills, power plants and other commercial waste
Zvornik (RS)	App. 900.000 t/g	
Mostar (FBiH)	Until 1992: app. 300.000 t/g	Following the reconstruction of the facility, the aluminium factory replaced the old technology and the previously used process. Consequently, there is no aluminium oxide production within the factory, and the red mud landfill is the remnant of the previously applied production technology
Srebrenica (RS)	App. 286 t/g of waste from exploitation of the mine (tailings)	
Vareš (FBiH)	Unknown	The mine is not active
Lower course of the river Vrbas (RS)	Unknown quantities of pesticide packaging	

### 2.3.6.6 Existing legal framework in the field of unintentional production and release of chemicals

#### Legally permissible concentrations of dioxins and furans in the environment, food and working environment in BiH

##### Environment

The *Regulation on Limit Values for Emissions of Pollutants into the Air of FBiH* (Official Gazette of FBiH, no. 12/05), the *Decree on Limit Values for Emissions of Pollutants into the Air of RS* (Official Gazette RS, no. 39/05), and the *Regulation on Limit Values for Emissions of Pollutants into the Air of BD* (Official Gazette BD, no. 30/06) prescribe identical limit values for PCDD/F from metal ore roasting or sintering facilities as presented in Table 141.

**Table 141:**  
PCDD/F limit values  
from metal ore roasting  
or sintering facilities

Pollutant	Emission limit value
PCDD/F	0.4 ng TEQ/Nm <sup>3</sup>

The *Regulation on Conditions for Operation of Waste Incineration Plants* of FBiH (Official Gazette of FBiH, no. 12/05, 102/12), the *Regulation on Conditions for Operation of Waste Incineration Plants* of RS (Official Gazette of RS, no. 39/05) and the *Regulation on Conditions for Operation of Waste Incineration Plants* of BD (Official Gazette of BD, no. 30/06) define the operating conditions and the measures for regulating emissions into the air, soil, surface waters and groundwaters and the risk to human health from facilities for incineration or co-incineration of solid or liquid waste. According to these Regulations, "hazardous waste" means any waste defined as such by an international convention and special regulation, and has one or more characteristics that cause danger to human health and the environment due to its origin, composition or concentration, as well as waste that is listed in the waste list as hazardous and regulated by an implementing regulation.

The Annexes of the Regulations are as follows:

- Annex I defines the equivalency factors for dibenzo-p-dioxins and dibenzofurans for the purposes of determining the total concentrations of dioxins and furans;
- Annex II sets emission limit values into the air for co-incineration of waste (the total emission limit value for dioxins and furans is determined as 0.1 C);
- Annex III defines the techniques for measuring the concentrations of pollutants in the air and water;
- Annex IV sets emission limit values for discharges of wastewater from the treatment of exhaust gases (the emission limit value expressed as mass concentration for unfiltered samples for dioxins and furans is 0.3 mg/l);
- Annex V defines the limit values of emissions into the air (the mean emission value for dioxins and furans is 0.1 ng/m<sup>3</sup>);
- Annex VI defines the formula for calculating emission concentrations on a standard percentage of oxygen concentration.

The Regulations stipulate that waste incineration and co-incineration plants are required to obtain a permit, and the permit is issued only if the request for obtaining the permit demonstrates that measurement techniques for air emissions are proposed in accordance with Annex III of the Regulations, and in accordance with paragraphs 1 and 2 of Annex III for water.

The operators of waste incineration and co-incineration plants are required to take the necessary precautions with regards to waste delivery and transportation to the greatest extent possible to prevent or limit the adverse effects on the environment, particularly the pollution of air, soil, surface water and groundwater, as well as the smell and noise pollution, and direct risks to human health.

Handling of waste tires (whose burning may generate polychlorinated dibenzodioxins and dibenzofurans) is not regulated by special regulations in FBiH, RS and BD.

##### Foodstuff

At the level of BiH, the *Regulation on Maximum Permitted Levels for Certain Contaminants in Foodstuffs* (Official Gazette of BiH, no. 37/09) defines the maximum permitted levels of dioxins and dioxin-like polychlorinated biphenyls (PCBs) in foodstuffs (Table 142) and the measures needed to be taken in case these maximum permitted levels are exceeded.

Item	Foodstuff	Maximum permitted level (MPL)	
		Total dioxins (WHO-PCDD/F-TEQ)	Total dioxins and dioxin-like PCBs (WHO-PCDD/F-PCB-TEQ)
1	Meat and meat products (excluding edible offal) of the following animals - bovine animals and sheep - poultry - pigs	3.0 pg/g fat	4.5 pg/g fat
		2.0 pg/g fat	4.0 pg/g fat
		1.0 pg/g fat	1.5 pg/g fat
2	Liver of terrestrial animals referred to in item 1, and derived products thereof	6.0 pg/g fat	12.0 pg/g fat
3	Muscle meat of fish and fishery products and products thereof, with the exemption of eel. MPL refer to crustaceans, except brown crab meat and head and thorax of lobster and similar large crustaceans (Nephropidae and Palinuridae)	4.0 pg/g wet weight	8.0 pg/g wet weight
4	Muscle meat of wild caught eel ( <i>Anguilla anguilla</i> ) and products thereof	4.0 pg/g wet weight	12.0 pg/g wet weight
5	Raw milk and dairy products, including butter fat	3.0 pg/g fat	6.0 pg/g fat
6	Hen eggs and egg products	3.0 pg/g fat	6.0 pg/g fat
7	Animal fats: - bovine animals and sheep - poultry - pigs	3.0 pg/g fat	4.5 pg/g fat
		2.0 pg/g fat	4.0 pg/g fat
		1.0 pg/g fat	1.5 pg/g fat
8	Mixed animal fats	2.0 pg/g fat	3.0 pg/g fat
9	Vegetable oils and fats	0.75 pg/g fat	1.5 pg/g fat
10	Marine oils (fish body oil, fish liver oil and oils of other marine organisms intended for human consumption)	2.0 pg/g fat	10.0 pg/g fat
11	Fish liver and derived products thereof with the exception of marine oils referred to in item 10		25.0 pg/g wet weight

**Table 142:**  
Maximum permitted levels of dioxins and dioxin-like PCBs in foodstuffs

Methods of sampling and analysis for the official control of dioxins and furans in foodstuffs are defined by the *Regulation on Methods of Sampling and Analysis for the Official Control of Levels of Dioxins and Dioxin-like PCBs in Foodstuffs* (Official Gazette of BiH, no. 43/09).

The *Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin* (Official Gazette of BiH, no. 89/12), in Annex II, defines the maximum residue levels of pesticides (MRL) for pesticide residues and the maximum residue levels (mg/kg) per groups and specimens of individual products. The Regulation refers to products of plant and animal origin or their parts (listed in Annex I), whether used as fresh, processed and/or an integral part of food and animal feed on or in which pesticide residues may be present. Hexachlorobenzene (HCB) is on the list. The *Regulation on Methods of Sampling and Analytical Methods for Implementation of Official Controls of Feed* (Official Gazette of BiH, No. 65/13) is in force, which is compliant with Regulation (EC) No. 152/2009 which stipulates the method of determining the levels of dioxins and PCBs.

#### Work environment

The *Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces* (SFRY, 1991) determines the maximum permissible concentrations (MPC) at worksites (Table 143), and the list of regulated substances includes the following POPs substances from this group:

Substance	MPCs		
	mol/m <sup>3</sup>	mg/m <sup>3</sup>	cm <sup>3</sup> /m <sup>3</sup>
Furan	7.35 x 10 <sup>-6</sup>	40	10
Hexachlorobenzene	3.16 x 10 <sup>-6</sup>	0.9	-
Pentachlorobenzene	1.90 x 10 <sup>-6</sup>	0.5	-
Polychlorinated biphenyls (chlorine content 42%)	-	1	0.1

**Table 143:**  
Maximum permissible concentrations (MPC) at worksites

96 Dioxins (sum of polychlorinated dibenzo-para-dioxins (PCDDs) and polychlorinated dibenzofurans (PCDFs), expressed as World Health Organisation (WHO) toxic equivalent using the WHO-toxic equivalency factors (WHO-TEFs)) and sum of dioxins and dioxin-like PCBs (sum of PCDDs, PCDFs and polychlorinated biphenyls (PCBs), expressed as WHO toxic equivalent using the WHO-TEFs). WHO-TEFs for human risk assessment based on the conclusions of WHO meeting held in Stockholm, Sweden, from 15 to 18 June 1997 (Van den Berg et al., (1998) Toxic Equivalency Factors (TEFs) for PCBs, PCDDs, PCDFs for Humans and for Wildlife. *Environmental Health Perspectives*, 106 (12), 775)

Furthermore, the above mentioned Standard stipulates that if two or more gases, vapours, mists, fumes or dust are found at the same time in the atmosphere of worksites, the opinion of the competent institutions must be obtained with regards to the assessment of the health risks to employees and the need to carry out protective occupational measures.

### **EU legislation in the field of unintentional released PCDD/F and PCB**

Bosnia and Herzegovina, as a potential candidate country for EU membership, assumed the obligation to harmonize its legislation with the EU legislation on the day of the signing of the Stabilization and Association Agreement (16/6/2008).

The key EU legislation dealing with unintentionally released PCDD/F and PBC are as follows:

- Commission Regulation (EC) 1881/2006 of 19 December 2006, setting maximum levels for certain contaminants in foodstuffs (including dioxins and dioxin-like polychlorinated biphenyls (PCBs))
- Commission Regulation (EC) 1883/2006 of 19 December 2006, laying down methods of sampling and analysis for the official control of levels of dioxins and dioxin-like PCBs in certain foodstuffs
- Council Directive 2006/88/EC of 6 February 2006, on reducing the presence of dioxins, furans and PCBs in food and feed
- Commission Recommendation 2006/794/EC of 16 November 2006, on the monitoring of background levels of dioxins, dioxin-like PCBs and non-dioxin-like PCBs in foodstuffs
- Directive 2000/76/EC of 4 December 2000, on the incineration of waste (amended by Directive 1137/2008), setting limit values for emissions into the air from waste incineration plants (including dioxins and furans)
- Regulation (EC) No. 850/2004 of 29 April 2004 on Persistent Organic Pollutants substances (POPs) amended by Council Regulation (EC) No. 1195/2006, 172/2007 and 323/2007).

### **2.3.6.6 Conclusions**

According to data collected during the inventory development in BiH from June to November 2013, the PCDD/PCDF Inventory Group has determined the following:

- Systematic analysis of the environment with regards to the presence of PCDD/PCDF and other unintentionally produced POPs is not performed in BiH, and there are no records of contaminated areas in terms of contamination with the chemicals listed in Annex C of the Stockholm Convention kept by ministries responsible for environmental issues in BiH;
- During the development of the PCDD/PCDF inventory, groups, categories and classes, or specific processes in which PCDD/PCDF are released into environmental components (air, water and land), as well as products and wastes/residues, have been identified. The main routes of PCDD/PCDF releases are PCDD/PCDF releases into residues/wastes and emissions into the air, while emissions into products, water and land are negligible;
- The largest emissions of dioxins and furans into the air occur during energy and heat generation, followed by iron and non-ferrous metal production, and finally the production of mineral products;
- The largest emission of dioxins and furans into residues occur during energy and heat generation, followed by waste disposal.

BiH, as part of the former country with a planned economy, "inherited" the remnants of out-dated technology used in the base industry and with it all the problems related to the environment. The PCDD/PCDF Inventory Group has based this conclusion on the fact that during the development of the inventory, the Group identified over 10 potential contaminated sites where some industrial activity was carried out or is still taking place.

Given the limited financial resources and the time period for development of the inventory within the Project, the PCDD/PCDF Inventory Group, in accordance with the guidelines provided by the UNEP Toolkit (2013), conducted a preliminary inventory of potential contaminated areas and hotspots, without field analysis of identified potentially contaminated areas. It is

necessary to supplement and / or expand this inventory in the following period, in order to verify the assumptions made by the Group on the contamination of locations specified in Table 140.

### 2.3.7 INFORMATION ON STOCKPILES, CONTAMINATED SITES AND WASTE

The preliminary inventory showed that in BiH there are no stockpiles of POPs pesticides and waste containing POPs pesticides (described in detail in Chapter 2.3.1). Disposal of POPs pesticides packaging was dealt with in an uncontrolled and disorganized manner, because in BiH there was no organized way for disposing of packaging of hazardous chemicals and packaging waste. However, the POPs Pesticides Inventory Group did not obtain information on locations of disposed packaging containing POPs pesticides, particularly of endosulfan and lindane, which were used until 2008. Furthermore, the existence of stockpiles and wastes of DDT has not been confirmed during the preliminary inventory.

The preliminary inventory of PCBs showed that the total amount of wastes containing PCBs, which is ready to be exported from BiH for final disposal and destruction amounts to 106,167 kg (described in detail in Chapter 2.3.2).

According to data from the preliminary inventory, stocks of PBDEs are contained in electronic and electrical equipment on user level in the amount of 2,324 kg hexaBDE i 9,086 kg heptaBDE, and in end of life vehicles in the amount of 301,699 kg tetraBDE, 530,259 kg pentaBDE, 73,139 hexaBDE i 4,571 kg heptaBDE.

PFOS is contained in consumer products, ranging from 47,159 to 284,200 kg, based on data on imports, exports and production obtained from the Agency for Statistics of BiH for 2012.

The PCDD/PCDF Inventory Group, in cooperation with the PCB Inventory Group, the Environment, Health, Research and Development Group and POPS Pesticides Inventory Group, and in line with UNEP Toolkit (2013), has identified over 15 potential contaminated (polluted) sites, mainly within former industrial plants, but also still active industrial complexes with inadequate and out-dated equipment and a lack of proper management of air emissions, wastewater and/or waste (as described in detail in Chapter 2.3.6).

Several sites have been identified, potentially contaminated with:

- POPs pesticides - large manufacturing conglomerates (AIPK „Mladen Stojanović“ – Nova Topola, Plantaže Gradiška – Trebovljani, PIK „Šamac“ – Šamac, Economy of the Agricultural Institute Banja Luka - Banja Luka- Trapisti, Agricultural Institute Butmir-Sarajevo HEPOK“ Mostar, Organization of Associated Labour for the purchase and processing of tobacco “Bosanac” in Orašje) where intensive agricultural production took place;
- polychlorinated biphenyls (PCB) – sites where the presence of PCB and PCB containing equipment was determined (electrical power companies in Sarajevo, Maglaj, Tešanj, Jelah, Visoko, Vitez, brown coal mines in Zenica, Breza, Đurđevik, hydropower plant in Čapljina, steel foundry Jelšingrad Livar a.d. in Banja Luka, and two certified operators for the collection of hazardous waste in Tuzla, Kemokop d.o.o. and in Lukavac, Kemis d.o.o.);
- dioxins and furans - oil refineries in Brod and Modriča, the former chlor - alkali complex in Tuzla, leather factory Visoko, former industrial complex Incel in Banja Luka, steel mill Arcelor Mittal in Zenica, alumina factory in Zvornik, sludge disposal site within the aluminium factory complex in Mostar, lead and zinc mines in Srebrenica and Vareš, various dumps for disposal of, among others, pesticides, in the lower course of the Vrbas River; and
- sites identified within the projects: APOPSBAL (“Assessment of the selected POPs (PCBs, PCDDs/Fs, OCPs) in the atmosphere and water ecosystems from the waste materials generated by warfare in former Yugoslavia”), “Persistent Pollutants in Rivers in Bosnia and Herzegovina”, MONET\_CEEC and the NATO ESP.EAP.SFP 984073 project “Development of a system to support decision making in reducing risks of environmental pollution of the Bosna River“, whose results have been presented in detail in the following chapters.

These sites should be further investigated for the purpose of verifying their contamination, as part of another project, or in the stage of revision of the inventory.

### 2.3.8 SUMMARY OF FUTURE PRODUCTION, USE AND RELEASE OF POPs

Table 144 gives an overview of current and estimated production, use and release of POPs, and it is the result of a preliminary inventory of POPs in BiH. These values will be amended in the course of preparation of a detailed inventory.

*Table 144:*  
Estimated production,  
use and release of POPs

POPs chemical	Year				
	2013 (Basic inventory)	2015	2020	2025	2030
<b>POPs pesticides</b>					
Production (tons)	(tons)	(tons)	(tons)	(tons)	(tons)
Aldrin	0.0	0.0	0.0	0.0	0.0
Dieldrin	0.0	0.0	0.0	0.0	0.0
Endrin	0.0	0.0	0.0	0.0	0.0
Hexachlorobenzene,	0.0	0.0	0.0	0.0	0.0
α- hexachlorocyclohexanes	0.0	0.0	0.0	0.0	0.0
β- hexachlorocyclohexanes	0.0	0.0	0.0	0.0	0.0
γ- hexachlorocyclohexanes (Lindan)	0.0	0.0	0.0	0.0	0.0
Heptachlor	0.0	0.0	0.0	0.0	0.0
Chlordane	0.0	0.0	0.0	0.0	0.0
Chlordecone	0.0	0.0	0.0	0.0	0.0
Mirex	0.0	0.0	0.0	0.0	0.0
PCBs	0.0	0.0	0.0	0.0	0.0
Toxaphene	0.0	0.0	0.0	0.0	0.0
Technical endosulfan and its isomers	0.0	0.0	0.0	0.0	0.0
Use	(tons)	(tons)	(tons)	(tons)	(tons)
Aldrin	*	0.0	0.0	0.0	0.0
Dieldrin	*	0.0	0.0	0.0	0.0
Endrin	*	0.0	0.0	0.0	0.0
Hexachlorobenzene,	*	0.0	0.0	0.0	0.0
α- hexachlorocyclohexanes	*	0.0	0.0	0.0	0.0
β- hexachlorocyclohexanes	*	0.0	0.0	0.0	0.0
γ- hexachlorocyclohexanes (Lindan)	*	0.0	0.0	0.0	0.0
Heptachlor	*	0.0	0.0	0.0	0.0
Chlordane	*	0.0	0.0	0.0	0.0
Chlordecone	*	0.0	0.0	0.0	0.0
Mirex	*	0.0	0.0	0.0	0.0
PCBs	*	0.0	0.0	0.0	0.0
Toxaphene	*	0.0	0.0	0.0	0.0
Technical endosulfan and its isomers	*	0.0	0.0	0.0	0.0
DDT	(tons)	(tons)	(tons)	(tons)	(tons)
Production	0.0	0.0	0.0	0.0	0.0
Use	0.0	0.0	0.0	0.0	0.0
PCBs	(tons)	(tons)	(tons)	(tons)	(tons)
Production	0.0	0.0	0.0	0.0	0.0
Use					
Closed and semi-closed systems	**	***	***	***	0.0
Opened systems	**	***	***	***	0.0
PBDEs (c-Hexa/PentaBDE and c-Tetra/PentaBDE)	(kg)	(kg)	(kg)	(kg)	(kg)
Production	0.0	0.0	0.0	0.0	0.0
Use					
tetraBDE	301,836	***	***	***	***
pentaBDE	530,501	***	***	***	***



POPs chemical	Year				
	2013 (Basic inventory)	2015	2020	2025	2030
hexaBDE	73,214	***	***	***	***
heptaBDE	4,737	***	***	***	***
Hexabromobiphenyl (HBB)	(tons)	(tons)	(tons)	(tons)	(tons)
Production	0.0	0.0	0.0	0.0	0.0
Use	**	***	***	***	***
Perfluorooctane sulfonate (PFOS) and their salts Perfluorooctane sulfonyl fluoride (PFOS-F)	(tons)	(tons)	(tons)	(tons)	(tons)
Production	0.0	0.0	0.0	0.0	0.0
Use	47.1- 284.2	***	***	***	***
Unintentional production and emission (Annex C)	(g TEQ/ god)	(g TEQ/ god)	(g TEQ/ god)	(g TEQ/ god)	(g TEQ/ god)
Hexachlorobenzene (HCB)	**	***	***	***	***
Pentachlorobenzene (PeCBz)	**	***	***	***	***
Polychlorinated biphenyl (PCB)	**	***	***	***	***
Polychlorinated Dibenzo-p-dioxins (PCDD) and Polychlorinated dibenzofurans (PCDF)					
Incinerators	0.1	***	***	***	***
Production of iron and non-ferrous metals	128.6	***	***	***	***
Power and heat production	62.9	***	***	***	***
Production of mineral products	4.3	***	***	***	***
Transport	0.0	***	***	***	***
Uncontrolled combustion processes	0.5	***	***	***	***
Production and use of chemicals and consumer goods	2.5	***	***	***	***
Other	0.1	***	***	***	***
Waste disposal/treatment	14.8	***	***	***	***
Potential hot spots	0.0	***	***	***	***

\* - Additional checks required<sup>97</sup>, \*\* - Not determined, \*\*\* - To be determined

Majority of POPs pesticides was banned 40 years ago, while lindan and endosulfan active substance pesticides were banned since 1 October 2008. The preliminary POPs inventory has shown that no pesticides were produced in Bosnia and Herzegovina. According to the applicable legislation, no future production or use of POPs pesticides is envisaged in Bosnia and Herzegovina.

Based on preliminary inventory it was established that no PCB mixtures have ever been nor are produced in Bosnia and Herzegovina. According to applicable legislation, no production of any PCB or equipment containing PCB is envisaged. The preliminary inventory has shown that PCB fluids are still used in BiH mainly in closed systems (power production equipment). However, it should be noted that the PCB inventory developed within the framework of this project is only a preliminary inventory, which was limited by the duration of the project and financial resources available. Once a detailed PCB inventory in BiH is developed reliable data on the use of PCB in Bosnia and Herzegovina will be obtained, and only then it will be possible to estimate the future use of this chemical. However, legal and operational measures and activities envisaged under this NIP imply phasing out of the use of equipment containing or contaminated by PCB by 2025 at the latest, as required by the Convention. The use of PCB in open systems shall be subject to evaluation during the implementation of NIP, therefore these data were not included in the above table.

In accordance with the *EC Regulation no. 757/2010*, a group of compounds commonly called polybrominated diphenyl ethers (PBDEs) is on the list of substances the marketing and

<sup>97</sup> Based on data provided by the BiH Statistics Agency for the period 2008-2013, it was established that during this period a certain quantity of goods (5,72 t) was imported under custom tariff 3808912000, indicating that the goods were pesticides, i.e. insecticides based on chlorinated hydrocarbons. Yet, based on current custom tariffs in Bosnia and Herzegovina, it was impossible to identify the specific chemical involved, so the Group tasked to prepare the POPs Pesticide Inventory could not establish, with certainty, if the imported chemicals contained POPs pesticides.

use of which is restricted to a maximum of 0,001% by weight when it occurs in substances, preparations, articles or as constituents of the flame-retarded parts of articles or to a maximum 0.1 % weight concentration when it occurs in the products produced partially or fully from recycled materials or materials from waste prepared for re-use. This regulation further provides that use of articles already in use before 25 August 2010 containing this group of compounds as a constituent of such articles shall be allowed. The provisions of this Regulation have been transposed to the *Regulation on Conditions for Restriction and Prohibition of Production, Putting into Circulation and Use of Chemicals* (Official Gazette of RS, no. 100/10, 63/13), which stipulates that articles placed on the market and already in use before coming into force of this Regulation - 9 July 2013 - shall be allowed. In the FBiH and BD no legislation governs this area.

Although the hexabromobiphenyl (HBB) is listed in Annex B (2009) as one of the substances the use of which has to be limited, due to the small production and limited use, most of the material containing HBB were disposed of decades ago (UNEP 2012 PBDEs Guidelines) and in accordance with the recommendations of the Guidelines, HBB was not subject to inventory.

According to the *EC Regulation no. 757/2010*, the concentration of PFOS must be less than 0.001 % by weight in substances and mixtures, i.e. the production, placing on the market and use shall be allowed in semi-finished products and articles, or parts thereof, if the concentration of PFOS is lower than 0.1 % (m/m) by weight calculated with reference to the mass of structurally or micro-structurally distinct parts that contain PFOS or, for textiles or other coated materials, if the amount of PFOS is lower than 1 µg/m<sup>2</sup> of the coated material. Use of articles already in use before 25 August 2010 containing PFOS as a constituent of such articles is allowed. Fire-fighting foams that were placed on the market before 27 December 2006 were allowed until 27 June 2011. In addition, this Regulation provides other exemptions for the use of PFOS provided that the amount released to the environment is reduced to a minimum by applying best available techniques (BATs). The provisions of this Regulation have been transposed to the *Regulation on Conditions for Restriction and Prohibition of Production, Putting into Circulation and Use of Chemicals* (Official Gazette of RS, no. 100/10, 63/13), which stipulates that articles placed on the market and already in use before 15 October 2010 shall be allowed. In the FBiH and BD no legislation governs this area.

BiH will have to respect the provisions of the said Regulation stipulating the limited use of these compounds. However, only after a detailed inventory of these substances is prepared one would be able to determine their exact quantities, which will be used to assess their future use.

Data on PCDD/PCDF emissions refer to all avenues of release (air, water, land, products, residues/waste) by main source categories, and they are based on the preliminary inventory. The estimate of PCDD/PCDF emissions to the environment in Bosnia and Herzegovina was prepared in accordance with 2013 UNEP Toolkit guidelines. The estimate was made for 2012, the last calendar year for which data required for the calculation were available. The group tasked to prepare an Inventory on PCDD/PCDF failed to obtain data for some of the categories identified in the guidelines, so the missing data should be collected during the implementation of NIP. Future projections of unintentional release of chemicals referred to in Annex C shall be assessed after the strategies to reduce emissions are drafted and adopted.

According to UNEP Toolkit (2013), PCDD/PCDF emissions are followed by emissions of other unintentionally formed POPs, which can be eliminated or minimised by the same measures used to tackle the issue of PCDD/PCDF emissions. Therefore, as recommended by UNEP (2013), this preliminary inventory was focused on dioxins and furans only, as they make a sufficient basis for identification and prioritisation of sources of all chemicals referred to in Annex C (hexachlorobenzene, pentachlorobenzene, polychlorinated biphenyls).

### 2.3.9 EXISTING PROGRAMS FOR MONITORING EMISSIONS AND THE IMPACT ON THE ENVIRONMENT AND HEALTH

Analysis of existing programs for monitoring emissions and the impact on the environment and human health is part of the inventory of persistent organic pollutants (POPs) in BiH in the period May – December 2013. The analysis was carried out by the Environment, Health, Research and Development Group within preparations for the implementation of the Stockholm Convention on POPs and work process is described in detail in Annex 6.

The following institutions are responsible for monitoring the environment and the effects of pollution on human health at state and entity levels:

The quality of media which is monitored	Institutions at state level		Institutions at entity level	
	BiH	FBiH	RS	BD
Air	-	<ul style="list-style-type: none"> <li>Federal Hydrometeorological Institute<sup>98</sup></li> </ul>	<ul style="list-style-type: none"> <li>Republic Hydrometeorological Institute of RS<sup>99</sup></li> <li>Authorized legal persons</li> </ul>	<ul style="list-style-type: none"> <li>BD Government – Department for Spatial Planning and Property Affairs</li> </ul>
Water	-	<ul style="list-style-type: none"> <li>Federal Public Health Institute<sup>100</sup></li> <li>Agency for the Sava River Basin District</li> <li>Agency for the Water Area of the Adriatic Sea</li> </ul>	<ul style="list-style-type: none"> <li>Public Health Institute of RS</li> <li>Public Institution “Vode Srspe”</li> <li>Republic Hydrometeorological Institute of RS</li> </ul>	<ul style="list-style-type: none"> <li>BD Government – Ministry of Agriculture, Forestry and Water Management</li> <li>BD Government – Department for Health and Other Services</li> </ul>
Soil	-	<ul style="list-style-type: none"> <li>Federal Institute for Agropedology</li> </ul>	<ul style="list-style-type: none"> <li>Agricultural Institute of RS</li> <li>Institute for Protection and Ecology of RS, Banja Luka</li> </ul>	<ul style="list-style-type: none"> <li>BD Government – Ministry of Agriculture, Forestry and Water Management</li> </ul>
Biome	-			
Plants and plant products	<ul style="list-style-type: none"> <li>The Administration of BiH for Plant Health Protection</li> </ul>	-	Agricultural Institute of RS	-
Waste	-	<ul style="list-style-type: none"> <li>Producer or owner of waste*</li> </ul>	<ul style="list-style-type: none"> <li>Producer or owner of waste*</li> </ul>	<ul style="list-style-type: none"> <li>Producer or owner of waste*</li> </ul>
Food	<ul style="list-style-type: none"> <li>Food Safety Agency of BiH</li> <li>State Veterinary Office of BiH</li> </ul>	<ul style="list-style-type: none"> <li>Federal Public Health Institute<sup>101</sup></li> </ul>	<ul style="list-style-type: none"> <li>Public Health Institute of RS</li> <li>PI Veterinary Institute “Dr Vaso Butozan”</li> <li>Agricultural Institute of RS</li> </ul>	<ul style="list-style-type: none"> <li>BD Government – Department for Health and Other Services</li> </ul>
Human exposure and health effects	<ul style="list-style-type: none"> <li>Food Safety Agency of BiH</li> </ul>	<ul style="list-style-type: none"> <li>Federal Public Health Institute FBIH<sup>102</sup></li> </ul>	<ul style="list-style-type: none"> <li>Public Health Institute of RS</li> </ul>	<ul style="list-style-type: none"> <li>BD Government – Department for Health and Other Services</li> </ul>

\* According to the “polluter pays” principle, pursuant to the Law on Waste Management FBIH, RS and BD, the producer or owner of waste shall bear all costs of prevention, treatment and disposal of waste, including aftercare and monitoring

The Agency for Statistics of BiH is responsible for the processing, distribution and determination of statistical data at the level of BiH and BD, whereas the Federal Institute of Statistics and the Republic Institute of Statistics of RS are responsible for the processing, distribution and determination of statistical data at the level of FBIH and RS.

### 2.3.9.1 Air quality monitoring

The main provisions related to air quality monitoring are contained in the *Law on Air Protection of FBIH* (“Official Gazette of FBIH”, no. 33/03 and 4/10), the *Law on Air Protection of RS* (Official Gazette of RS, no. 124 / 11) and the *Law on Air Protection of BD* (Official Gazette of the Brčko District BiH, no. 25/04, 1/05, 19/07, 9/09). These laws are accompanied by implementing regulations which further regulate the organization of air quality monitoring in BiH.

The *Regulation on Monitoring Air Quality* (Official Gazette of FBIH, no. 1/12) defines the method of sampling for the analysis of certain taxatively listed pollutants in urban and rural areas, but none of these pollutants are listed in the annexes to the Stockholm Convention<sup>103</sup>. *Law on Air Protection of RS* (Official Gazette of RS, no. 124 / 11) defines “the unintentionally released persistent organic pollutants” and this group includes polychlorinated dibenzodioxins and furans, polycyclic aromatic hydrocarbons, polychlorinated biphenyls and hexachlorobenzene. The other substances listed in the annexes to the Stockholm Convention are not mentioned.

<sup>98</sup> Competent authorities of cantons and local government units are responsible at lower administrative levels.

<sup>99</sup> The Republic Hydrometeorological Institute of RS and authorized legal persons are responsible for monitoring air quality in the republic network of measuring stations. Local government units are responsible for monitoring air quality in the local network of measuring stations.

<sup>100</sup> Cantonal institutes for public health are responsible at lower administrative levels

<sup>101</sup> Cantonal institutes for public health are responsible at lower administrative levels

<sup>102</sup> Cantonal institutes for public health are responsible at lower administrative levels

<sup>103</sup> The Regulation refers to polycyclic aromatic hydrocarbon related benzo (a) pyrene, but these compounds are not listed in the annexes to the Stockholm Convention, even though they meet the conditions to be included in POPs.

**Table 145:**  
*Institutions responsible for monitoring the environment and the effects of pollution on human health*

Article 8 of this Law defines the substances which are required to be specified for air quality assessment, but none of these substances are listed under the Stockholm Convention<sup>104</sup>. The *Law on Air Protection of BD* (Official Gazette of the Brčko District BiH, no. 25/04, 1/05, 19/07, 9/09) lists the substances that are entered on the register of emissions into air, among which there were no substances listed in the annexes to the Stockholm Convention.

Table 145 gives an overview of the institutions responsible for air quality monitoring in BiH. Federal Hydrometeorological Institute and the Republic Hydrometeorological Institute report the results of the monitoring to the entity ministries responsible for the environment, the Entity Ministries of Health, i.e. within the above-mentioned the entity public health institutes, the entity statistical institutes in BiH, the European Environment Agency (according to prescribed format) and the Secretariat of the relevant conventions (according to prescribed format) ratified, signed or joined by BiH. The results are published in the Statistical Yearbook of the Federation of BiH, i.e. the Statistical Yearbook of Republika Srpska. Upon examining the results of monitoring published in these yearbooks for 2012, it has been established that the results of a systematic monitoring of the substances that are explicitly listed in the annexes to the Stockholm Convention, in any environmental media, in air, water, food, biome, soil or waste, are not being published. In Brčko District, the results of tests on air quality are publicly available on the website of BD Government, but again, there are no results related to the substances listed under the Stockholm Convention.

Based on the analysis of collected data, the Environment, Health, Research and Development Group concluded that the institutions that carry out air quality monitoring comply with applicable regulations and conduct tests on the most basic parameters of air quality which are specified in these regulations. However, the essential problem is the fact that none of the regulations mention the requirement to monitor substances listed in the annexes to the Stockholm Convention, and therefore the institutions authorized for air quality monitoring do not perform measurements of concentrations.

The Environment, Health, Research and Development Group received information from the Federal Ministry of Environment and Tourism provided from the Register of polluters on the annual emissions into air released by registered producers of hazardous waste for 2011 and 2012. In this report, the polycyclic aromatic hydrocarbons (PAHs) are listed as a single group of substances. As for compounds that are explicitly listed in the annexes to the Stockholm Convention, a reference is made to organochlorine insecticides, PCBs, dibenzodioxins and furans, which are produced and/or packaged in only two companies (GPD Drina d.d. Goražde and "Herceg" d.o.o. Srebrenik). According to data from the Register of polluters delivered by the Federal Ministry of Environment and Tourism, in both cases no emissions were detected for all the above-mentioned substances, although in a footnote it is stated that the values for GPD Drina d.d. Goražde were measured, whereas the values for "Herceg" d.o.o. Srebrenik were merely estimated. Annex 8 presents the results provided by the Federal Ministry of Environment and Tourism related to polycyclic aromatic hydrocarbons (PAH) and POPs from the list of the Stockholm Convention.

Based on data from the Environmental Protection Fund of FBiH, for over a year the Fund has been acting in compliance with the *Decree on Types of Fees and Criteria for Calculation of Fees for Air Polluters* (Official Gazette of FBiH, no. 66/11) which refers to emissions of SO<sub>2</sub>, NO<sub>2</sub> and particulate matter, while other types of pollutants are not subject to this Decree. Therefore the Fund deals only with data on emissions required for the calculation of fees and it has no access to data on the results of measurements of the unintentionally produced POPs substances which are generated from emissions into air (dioxins and furans).

### 2.3.9.2 Water quality monitoring

The *Law on Water FBiH* (Official Gazette of FBiH, no.70/06), the *Law on Water RS* (Official Gazette of RS, no. 50/06 and 92/09 and 121/12), and the *Law on Water Protection of BD* (Official Gazette of BD, no. 25/04; 1/05 and 19/07) constitute the basis for organizing water monitoring in BiH. Table 145 gives an overview of the institutions responsible for water quality monitoring in BiH.

According to these laws and related bylaws, the water agencies in FBiH and RS organize hydrological monitoring and water quality monitoring, monitoring of the ecological status of surface water, monitoring of quality of groundwater, prepare a report on the state of water quality and recommend measures necessary to achieve the objectives related to water protection, water regulation, protection against harmful effects of water and water use. Data

<sup>104</sup> This article leaves open the possibility of defining other polluting substances that are specified by relevant international regulations.

on quality monitoring of surface water are delivered to the European Environment Agency. According to data from the State of the Environment Report of BiH 2012, the European Environment Agency receives only data on materials that affect the biochemical oxygen demand (BOD) and data on materials that affect the growth of algae (mainly phosphates), and systematic monitoring of groundwater is conducted only when quality monitoring of water resources is being implemented. According to the same Report, in Bosnia and Herzegovina there is no systematic reporting at state level on monitoring water quality, except for the reports that are sent to European Environment Information and Observation Network – EIONET. In Brčko District, monitoring of surface waters is under the jurisdiction of the Department of Agriculture, Forestry and Water Management of the BD Government. Operative water monitoring is carried out by monitoring the physical-chemical parameters (among which there are no substances that are listed under the Stockholm Convention), suspended materials, oxygen content, permanganate index, BOD, oxygen percentage, total alkalinity, total hardness, bicarbonates, electrical conductivity, dry residue, annealed residue, chlorophyll, magnesium, ammonium ion, nitrite, nitrate, total Kjeldahl nitrogen, orthophosphate, total phosphate, total phosphate filtered and calcium, the speed of natural water flows by hydrometric measuring, determining the microbiological parameters of water and heavy metals (Fe, Cu, Hg, Mn, Zn, Cr) and determining saprobiological parameters.

The Federal Public Health Institute (along with the cantonal public health institutes), The Public Health Institute of RS monitor, analyse, examine and assess the safety of drinking water, water for dialysis, water for recreation, surface and waste water. The results of monitoring should be published in the statistical yearbooks, i.e. the annual reports on health status prepared by the Entity Institute and the Public Health Institute. While reviewing the statistical yearbooks, the Environment, Health, Research and Development Group was unable to find information on the results of monitoring of substances from the list of the Stockholm Convention in water.

In response to the letters sent by the Environment, Health, Research and Development Group, the Ministry of Physical Planning, Civil Engineering and Ecology of RS stated that it does not possess information about the systemic monitoring of substances listed in the annexes to the Stockholm Convention, and the Public Health Institute of RS stated that it does not perform monitoring of these substances in water, air, soil and food.

On the basis of information obtained from the Federal Public Health Institute it has been established that the Institute conducted water quality monitoring as part of its ordinary activities, in accordance with Article 116 of *the Law on Health Protection* (Official Gazette of FBiH, no. 46/10). Monitoring was conducted to determine the presence of organochlorine insecticides from the list of the Stockholm Convention (aldrin, dieldrin,  $\alpha$ -,  $\beta$ - and  $\gamma$ - HCH, endrin, heptachlor, hexachlorobenzene, endosulfan and DDT continuously in the period from 2006 to 2012 in the rivers Neretva and Bistrica<sup>105</sup> and in underground waters that supply drinking water for Hercegovračko-neretvanski, Hercegbosanski and Zapadnohercegovački Cantons. In accordance with the Federal Institute of Public Health, during the year 2013 water quality monitoring was expanded to include the rivers Ričina, Šujica, Rama, and lakes Deransko and Blidinje, as well as the sea water in the vicinity of the town of Neum. During this period, from January 2006 to June 2013 (the first 6 months of 2013), 393 samples were analysed for the presence of organochlorine insecticides. PCB monitoring was carried out periodically during the same period and in the same places and a total of 135 samples were analysed. Determining of polycyclic aromatic hydrocarbons was performed during the same period and in the same locations, in a total of 285 samples. Furthermore 22 samples of water for bottling were also tested for the presence of PCBs and organochlorine insecticides. In all samples values of the tested pollutants were below the maximum permissible concentration, and in most cases below the detection limit of the instrument. Annex 9 (Table 9. 1) presents the results of monitoring. All results were below the maximum permissible concentration (MPC) and most were below the limit of quantification.

Based on the information provided by the Agency for the Water Area of the Adriatic Sea, in the period from May 2011 to August 2013 determination of concentrations of total organochlorine insecticides and total PCBs was performed at locations Trebižat, estuary; hydro accumulation power plant Grabovica; hydro accumulation power plant Salakovac and Neretva Dračevo, Neretva; Konjic – downstream and Neretva Žitomislíci based on expert assessment by the Agency for the Water Area of the Adriatic Sea. During 2013 two samples of water from Rakitnica were analyzed. In all cases, the measured concentrations amounted

<sup>105</sup> River in the western part of Bosnia and Herzegovina, it flows through the eastern part of Livanjsko polje. Bistrica is about three kilometers long. In its first kilometer it flows through the town of Livno and continues to flow through Livanjsko polje. It belongs to the Adriatic river basin. During the summer the riverbed is usually dry and during autumn it overflows due to heavy rainfall. It originates at the hills Bašajkovac, at the spring Duman.

to either 0 µg/l or 0.01 µg/l. In addition to the aforementioned compounds, total PAHs and diethylhexyl phthalate, which are not listed under the Stockholm Convention, were analysed as well. Annex 9 (Table 9. 2) gives a summary view of the submitted results.

According to information provided by Agency for the Sava River Basin District, the Agency carries out monitoring of surface water quality in accordance with the Law on Water and the recommendations of the Water Framework Directive (WFD). The substances that are listed under the Stockholm Convention and occur in waters, are defined by the Directive 2008/105/EC (list of priority substances), which complements the WFD. Monitoring the concentrations of priority substances is mandatory for the member states of the European Union. Among the substances included in Annexes A, B and C to the Stockholm Convention, 10 substances (chlordane, chlordecone, heptachlor, hexabromobiphenyl, mirex, polychlorinated biphenyls, toxaphene, perfluorooctane acid, its salts and perfluorooctane sulfonyl fluoride, PCDD and PCDF) are not on the list of priority substances according to the Water Framework Directive.

During the supervisory monitoring of quality of water bodies with a basin area greater than 100 km<sup>2</sup> (103 measurement points on 93 water bodies) in 2011 and 2012, the concentrations of the following substances covered by the Convention were analyzed: alpha hexachlorocyclohexane, beta hexachlorocyclohexane, gamma-hexachlorocyclohexane (lindane), endosulfan. Analysis of the concentrations of polycyclic aromatic hydrocarbons (naphthalene, anthracene, fluoranthene, benzo (b) fluoranthene, benzo (k) fluoranthene, benzo (a) pyrene, benzo (g, h, i) perylene and indeno (1, 2,3 -cd) pyrene) were conducted as well.

According to data on quality monitoring of surface waters in the last two years (2011 and 2012) the following substances exceeded environmental quality standards:

- beta hexachlorocyclohexane (exceeded environmental quality standards at nine measurement points in the basins of the rivers Sava, Bosna, Drina, hydro accumulations Modrac and Hazna),
- delta hexachlorocyclohexane (exceeded environmental quality standards at measurement points in river Krivaja and hydro accumulation Hazna),
- polycyclic aromatic hydrocarbons (exceeded environmental quality standards for the sum of benzo (g, h, i) perylene and indeno (1: Z, 3 - cd) pyrene at twenty-three measuring points in the basins of the rivers Sava, Una, Vrbas, Bosna, Drina, hydro accumulation Modrac).

The Environmental Protection and Energy Efficiency Fund of Republika Srpska has, in cooperation with the public institution "Vode Srpske" in Bijeljina conducted POPs monitoring at several locations in the river water of Vrbas in the period 2007-2010 . The results are shown in the following tables.

**Table 146:**  
Concentrations of POPs regulated by the Stockholm Convention measured in Delibašino village in 2010

Name of substance	Date of sampling					
	17 March	28 April	29 May	08 July	26 August	01 October
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
4,4'-DDT	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Gama-HCH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>

**Table 147:**  
Concentrations of POPs regulated by the Stockholm Convention measured in Novoselje during 2011

Name of substance	Date of sampling			
	10 May	23 June	15 August	19 September
Dieldrin	<0.923	<0.425	0.202	<0.167
Endrin	<0.923	<0.425	0.202	<0.167
DDT total	<0.923	<0.425	0.202	<0.167
4,4'-DDT	<0.923	<0.425	0.202	<0.167
Endosulfan I	<0.923	<0.425	0.202	<0.167
Hexachlorobenzene	<0.923	<0.425	0.202	<0.167
Gama-HCH	<0.923	<0.425	0.202	<0.167

Since 2007, under the annual program for monitoring water quality of watercourses, the public institution "Vode Srpske" in Bijeljina has been systematically implementing and monitoring POPs that are on the list of priority substances pollution in water policy. Table 9. 3 - Table 9. 14 show the results of POPs monitoring in the period from 2007 to 2010 at measuring profiles of the following rivers: Sava, Vrbas, Una, Bosna, Drina, Sanja, Vrbanja, Crna Rijeka, Spreča, Usora, Ukrina, Ugar, Lim, Čehotina, Drinjača and Prača.

The Department of Agriculture, Forestry and Water Management of Brčko District Government BiH stated that monitoring of substances referred to in the annexes to the Stockholm Convention is not carried out as part of the regular monitoring of the watercourse Sava, Brka and Tinja.

### 2.3.9.3 Soil quality monitoring

The legal basis for monitoring the quality of soil in BiH is constituted by the *Law on Agricultural Land of FBiH* (Official Gazette of FBiH, no. 52/09) and *Law on Agricultural Land of RS* (Official Gazette of RS, no. 93/06; 86/07; 14/10 and 05/12) and *Law on Agricultural Land of BD* (Official Gazette of BD, no. 32/04; 20/06; 19/07). Table 145 lists the institutions responsible for soil quality monitoring in BiH. In accordance with the *Law on Agricultural Land of RS* (Official Gazette of RS, no. 93/06; 86/07; 14/10 and 05/12) the development of the regulations, which will describe in more detail the procedures of performing quality control of soil for the purpose of determining the permissible quantities of hazardous and harmful substances in agricultural land, irrigation water, and the allowable quantities and sampling for these tests, is in progress, and they are as shown below:

- Regulation on permitted amounts of hazardous and harmful materials in agricultural land and irrigation water and on methods for their testing and
- Regulation on conditions which must be fulfilled by companies, other organizations and institutions for determining hazardous and harmful materials in agricultural land and irrigation water.

During 2014 RS has adopted two regulations related to the Law mentioned above – the *Regulation on Conditions, Ways and Methods for Testing the Fertility of Agricultural Land and for Determining the Quantities of Mineral Fertilizers and Pesticides* (Official Gazette of RS, no. 26/14) and the *Regulation on Conditions Which Must be Fulfilled by Companies, Other Organizations And Institutions in Terms of Equipment and Personnel for Testing the Fertility of Agricultural Land and for Determining the Quantities of Mineral Fertilizers and Pesticides* (Official Gazette of RS, no. 26/14).

According to the responses the Environment, Health, Research and Development Group received to the letters sent to the identified institutions, the Federal Public Health Institute and the Public Health Institute of RS do not conduct this kind of monitoring, but instead it is carried out within the Federal Institute for Agropedology and the Agricultural Institute of RS. According to the information submitted by the Federal Institute for Agropedology, monitoring of 260 locations for the presence of 15 polycyclic aromatic hydrocarbons (PAHs) in soil was carried out in the period 2008-2011. There are no data on the other substances listed in the annexes to the Stockholm Convention. In accordance with the valid *Regulation on the Methodology for Monitoring Agricultural Land* (Official Gazette of FBiH, no. 38/11) the Federal Institute for Agropedology plans to continue soil monitoring in FBiH every three years with the possibility of adapting the EU monitoring system, which is planned to be implemented throughout the whole country in the future.

Table 10. 1, Table 10. 2 and Table 10. 3 (Annex 10) present the results of determining PAHs contents in soil samples. According to the Federal Institute for Agropedology soil monitoring was performed at 260 locations, which are, based on the network in the Gauss-Kruger projection system, defined as sites with a rectangular layout in which the distance between each point is approximately 10 km. Topographic maps in scale M1: 25000, satellite and ortho-photo imagery were used. Figure 28 presents the map with the locations provided by the Federal Institute for Agropedology.

**Figure 28:**  
Cartographic view of  
260 locations in FBiH  
where soil sampling was  
conducted



It should be noted that most of the substances examined by the Federal Institute for Agropedology were specified in the *Regulation on Determination of Allowed Quantities of Harmful and Dangerous Substances in Soil and Method of Testing* (Official Gazette of FBiH, no.72/09), although there is also reference to some of the organochlorine insecticides and TCDD. The Regulation defines PAHs as harmful substances, and Article 7 of this Regulation, specifies the limit values for total PCBs as 0.2 mg/kg of dry soil; total DDT and its metabolites as 0.1 mg/kg of dry soil, aldrin, dieldrin and endrin as a total amount of 0.1 mg/kg of soil and for total HCH isomers as 0.1 mg/kg of soil. In all cases, soil samples were air-dried. According to the same Article, in carbonate soils these values increase by 25%. Article 13 specifies the maximum allowable amount of organic pollutants related to urban sludge and mentions 2,3,7,8 TCDD; sum of PCBs, HCH isomers and other compounds. Unfortunately, all substances listed in the annexes to the Stockholm Convention are not referred to in the Article. Article 29, which deals with methods of analysis, states that PAHs and DDT can be determined by applying colorimetric and spectrophotometric methods, which is absolutely not applicable in the analysis of traces, with regard to the maximum permissible concentrations of these compounds in soil and sludge, defined by previous articles. Article 32 is equally paradoxical and indicates that the analysis of sludge used as fertilizer should be conducted every six months (or 12 months), and among the parameters that need to be analyzed there is no mention of POPs for which the limits are specified in Article 13.

According to information received by the Environment, Health, Research and Development Group, with the exception of testing PAHs, the Federal Institute for Agropedology did not perform testing of substances listed under the Stockholm Convention.

The Environment, Health, Research and Development Group did not receive information on soil monitoring from the Agricultural Institute of RS.

#### 2.3.9.4 Monitoring of biome

The term biome usually refers to biocenosis or a large area of ecozone on land and the types of ecological communities that live in it are determined by the macroclimatic conditions.

In addition to the entity laws on environmental protection, the main regulations related to the protection of nature are prescribed by the *Law on the Protection of Nature FBiH* (Official Gazette of FBiH, no.66/13), the *Law on the Protection of Nature RS* (Official Gazette of RS, no. 24/04) and the *Law on the Protection of Nature BD* (Official Gazette of BD, no. 24/04, 1/05 19/07 and 9/09).

According to the *Regulation on Establishing and Managing an Information System for Protecting Nature and Monitoring* (Official Gazette of FBiH, no. 46/05) the Federal Ministry of Environment and Tourism processes and consolidates collected data on the quality status of nature, prepares reports and keeps records in the FBiH. This regulation has not yet been adopted in RS and BD.



Based on the analysis of laws and bylaws, the Environment, Health, Research and Development Group concluded that in relation to monitoring the quality of the biome, pollutants and the substances listed in the annexes of the Stockholm Convention are not mentioned anywhere. Therefore there are no systematic monitoring results as there is no institution responsible for the systematic monitoring of POPs in biome.

### 2.3.9.5 Food quality monitoring

Based on the analysis of the legislation in BiH, the Food Safety Agency of Bosnia and Herzegovina, the Veterinary Office of Bosnia and Herzegovina, the Public Health Institute of the Federation of Bosnia and Herzegovina, the cantonal institutes, the Public Health Institute of Republika Srpska, PI Veterinary Institute "Dr Vaso Butozan" and the Agricultural Institute of Republika Srpska are in charge of food monitoring (Table 145). In this context, when we talk of food, we also refer to drinking water<sup>106</sup>.

In accordance with the *Regulation on Maximum Residue Levels of Pesticides in or on Food and Feed of Plant and Animal Origin* (Official Gazette of BiH, no. 89/12) the Food Safety Agency BiH developed a multi-year program plan for control of pesticide residues, in cooperation with the Plant Health Protection Administration of BiH and the Veterinary Office of BiH (National Control Programme for pesticide residues). The National Residue Control Plan BiH is being implemented since 2006. It is financed from the budget of institutions of BiH. The National Residue Control Plan BiH generally complies with the Council Directive 96/23/EC with regard to types of products that are sampled: cattle, sheep, pigs, poultry, fish, milk, eggs and honey. The group of substances that are tested includes organochlorine pesticides, organophosphorus pesticides, carbamates and pyrethroids. According to the official information provided by the Veterinary Office, the examinations are carried out in laboratories in the region (Institute of Meat Hygiene and Technology in Belgrade, Public Health Institute in Maribor, Croatian Veterinary Institute in Zagreb) because these laboratories are accredited according to the standard EN ISO 17025. According to the same source, competent institutions in BiH have been working on gaining accreditation of laboratories by the above-mentioned standard as well as the validation of methods. Laboratories that are recognized by the Veterinary Office of BiH as laboratories equipped with the most advanced technology:

1. Veterinary Faculty in Sarajevo
2. VI "Dr Vaso Butozan" Banja Luka
3. Federal Agro-Mediterranean Institute in Mostar
4. KJP veterinary station in Sarajevo

These laboratories, in addition to other methods, also deal with the introduction and validation of methods for testing organochlorine pesticides, organophosphorus pesticides, carbamates and pyrethroids in foods of animal origin. The Office, in cooperation with the project FARMA, organizes the training and the procurement of necessary equipment and reference material so as to help achieve the laboratory accreditation and validation of methods. Testing of pesticides is performed in muscle, fat tissue, kidney, milk, fish, honey and eggs.

National Control Programme for pesticide residues is updated annually and is based on a risk assessment, with a particular focus on the assessment of consumer exposure. In accordance with the *Regulation on Maximum Residue Levels of Pesticides in or on Food and Feed of Plant and Animal Origin* (Official Gazette of BiH, no. 89/12), each year the Food Safety Agency of BiH submits the results of the monitoring program for pesticide residues to the Council of Ministers.

- Paragraph 3 of Article 12 explicitly states the following "The results of the monitoring program for pesticide residues are published annually on the Agency website".
- Article 13 of this Regulation (Annual Report on pesticide residues) in paragraph 5 states the following: "The Agency shall publish annual reports as well as any comments of competent institutions of Bosnia and Herzegovina, the Entities and Brčko District of Bosnia and Herzegovina in a manner accessible to the public."

Therefore, pursuant to the provisions of this Regulation, the Food Safety Agency should disclose annual results of monitoring of pesticide residues in food. These data were not available on the official website of the Food Safety Agency (last accessed 8 October 2013).

The only information related to the implementation of the monitoring of pesticide residues in food, in accordance with the provisions of the Regulation, is the information from 5

<sup>106</sup> Law on Food BiH (Official Gazette of BiH, no.50/04), Article 2; paragraph 3; items a), b) and c)

August 2013 when it was announced that seven selected laboratories will participate in the proficiency testing by which their ability to analyse traces of pesticides in food will be verified. The laboratories in question are:

- Public Health Institute of F BiH in Mostar/Sarajevo;
- Federal Agricultural Institute in Sarajevo;
- Federal Agro-Mediterranean Institute in Mostar;
- Public Health Institute of RS in Banja Luka;
- Agricultural Institute of RS in Banja Luka;
- Veterinary Institute of Unsko-sanski Canton in Bihać
- Agricultural Institute of Unsko-sanski Canton in Bihać.

In accordance with the *Regulation on the Implementation of the Monitoring Plan - Food Monitoring* (Official Gazette, no. 21/11), the Food Safety Agency BiH is responsible for the adoption of the monitoring plan, its implementation and the publication of the results.

According to data the Environment, Health, Research and Development Group obtained from the Food Safety Agency BiH by examining the database of laboratory control of food in BiH, the information regarding the results of laboratory control of pesticide residues in or on food and animal feed:

- In 2010 1,180 samples were analysed for the presence of pesticide residues (0.76% inadequate samples),
- In 2011 1,514 samples were analysed (0.67% inadequate samples),
- In 2012 1,177 samples were analysed (there were no inadequate samples).

The Food Safety Agency BiH did not provide explicit information in relation to the monitoring of POPs pesticides, i.e. their presence in or on food and animal feed, but only aggregate data on the number of samples and the rate of inadequate samples. There is no data on the analysis of traces of PCBs and other substances that are on the list of the Stockholm Convention (even though their monitoring is prescribed by relevant regulations).

The Environment, Health, Research and Development Group was unable to obtain further information on monitoring from the Food Safety Agency BiH.

The Environment, Health, Research and Development Group analysed the scientific literature and found the results of testing food products for the presence of POPs pesticides in BiH.

The publication which revealed the test results for pesticide residues in samples of pears and plums taken from a wider area in Banja Luka is an exception. Testing of pesticide residues in plums and pears was conducted according to the principle of Multiresidue Method for the Analysis of Pesticide Residues in Fruits and Vegetables (Julie Fillion, Francois Sauve and Jenifer Selwyn, Pest Management Regulation Agency, Laboratory, Building 22, Central Experimental Farm, Ottawa, Ontario, K1A0C6, Canada) in the laboratory of the Institute of Field and Vegetable Crops in Novi Sad, in collaboration with the Agricultural Institute in Banja Luka. During the analysis 29 chemical compounds were tested i.e. verified whether there are remains of these compounds in the submitted samples of fresh pears and plums. Some of the organochlorine insecticides listed in the annexes to the Stockholm Convention were also tested. Table 148 and Table 149 show the results of these tests.

**Table 148:**  
Test results for the presence of pesticide residues in samples of pears (Nježić, 2006)

Tested chemical compounds	Detected					LOD	EU MRL for pears	Unit of measure
	Sample 1	Sample 2	Sample 5	Sample 6	Sample 7			
Lambda-cyhalothrin	n.d.	n.d.	n.d.	n.d.	n.d.	-	0.1	mg/kg
Dichlorvos	n.d.	n.d.	n.d.	n.d.	n.d.	0.03	0.1	mg/kg
Dichlobenil	n.d.	n.d.	n.d.	n.d.	n.d.	0.04	-	mg/kg
Deltamethrin	n.d.	n.d.	n.d.	n.d.	n.d.	0.33	0.1	mg/kg
Alpha HCH	n.d.	n.d.	n.d.	n.d.	n.d.	-	-	mg/kg
Dimethoate	n.d.	n.d.	n.d.	n.d.	n.d.	0.03	0.02	mg/kg
Beta HCH	n.d.	n.d.	n.d.	n.d.	n.d.	-	-	mg/kg
Lindane	n.d.	n.d.	n.d.	<LOD	n.d.	0.02	0.01	mg/kg
Delta HCH	n.d.	n.d.	n.d.	n.d.	n.d.	0.02	-	mg/kg
Heptachlor	n.d.	n.d.	n.d.	n.d.	n.d.	0.02	0.01	mg/kg

Tested chemical compounds	Detected					LOD	EU MRL for pears	Unit of measure
	Sample 1	Sample 2	Sample 5	Sample 6	Sample 7			
Pirimiphos-methyl	n.d	n.d	n.d	n.d	n.d	0.02	0.05	mg/kg
Fenitrothion	n.d	n.d	n.d	n.d	n.d	0.03	0.5	mg/kg
Aldin	n.d	n.d	n.d	n.d	n.d	-	-	mg/kg
Malathion	n.d	n.d	n.d	n.d	n.d	0.04	0.5	mg/kg
Chlorpyrifos	n.d	n.d	n.d	n.d	n.d	0.02	0.5	mg/kg
Heptachlor epoxide	n.d	n.d	n.d	n.d	n.d	0.05	-	mg/kg
Kaptan	n.d	n.d	n.d	<LOD	n.d	0.8	3	mg/kg
Procymidone	n.d	n.d	n.d	n.d	n.d	0.03	1	mg/kg
Methidathion	n.d	n.d	n.d	n.d	n.d	0.04	0.3	mg/kg
Endosulfan	<LOD	n.d	n.d	<LOD	n.d	0.02	0.3	mg/kg
DDE+dieldrin	n.d	n.d	n.d	n.d	n.d	0.02	-	mg/kg
Endrin	n.d	n.d	n.d	n.d	n.d	0.02	0.01	mg/kg
DDD	n.d	n.d	n.d	n.d	n.d	0.02	-	mg/kg
Endrin aldehyde	n.d	n.d	n.d	n.d	n.d	-	-	mg/kg
Endosulfan sulfate	n.d	n.d	n.d	n.d	n.d	0.08	-	mg/kg
DDT	n.d	n.d	<LOD	<LOD	<LOD	0.02	0.05	mg/kg
Bifentrein	n.d	n.d	n.d	n.d	n.d	0.03	0.3	mg/kg
Cypermethrin	n.d	<LOD	n.d	0,763	0,477	0.1	1	mg/kg

NOTE: n.d. -not detected; LOD-limit of detection; MRL-maximum allowed concentrations

Tested chemical compounds	Detected					LOD	EU MRL for plums	Unit of measure
	Sample1	Sample2	Sample5	Sample6	Sample7			
Lambda-cyhalothrin	n.d	n.d	n.d	n.d	n.d	-	0.1	mg/kg
Dichlorvos	n.d	n.d	n.d	n.d	n.d	0.03	0.1	mg/kg
Dichlobenil	n.d	n.d	n.d	n.d	n.d	0.04	-	mg/kg
Deltamethrin	<LOD	n.d	n.d	n.d	n.d	0.33	0.1	mg/kg
Alpha HCH	n.d	n.d	n.d	n.d	n.d	-	-	mg/kg
Dimethoate	n.d	n.d	n.d	n.d	n.d	0.03	0.02	mg/kg
Beta HCH	n.d	n.d	n.d	n.d	n.d	-	-	mg/kg
Lindane	n.d	n.d	n.d	n.d	n.d	0.02	0.01	mg/kg
Delta HCH	n.d	n.d	n.d	n.d	n.d	0.02	-	mg/kg
Heptachlor	n.d	n.d	n.d	n.d	n.d	0.02	0.01	mg/kg
Pirimiphos-methyl	n.d	n.d	n.d	n.d	n.d	0.02	0.05	mg/kg
Fenitrothion	n.d	n.d	n.d	n.d	n.d	0.03	0.5	mg/kg
Aldin	n.d	n.d	n.d	n.d	n.d	-	-	mg/kg
Malathion	n.d	n.d	n.d	n.d	n.d	0.04	0.5	mg/kg
Chlorpyrifos	n.d	n.d	n.d	n.d	n.d	0.02	0.2	mg/kg
Heptachlor epoxide	n.d	n.d	n.d	n.d	n.d	0.05	-	mg/kg
Kaptan	n.d	n.d	n.d	n.d	n.d	0.8	2	mg/kg
Procymidone	n.d	<LOD	n.d	n.d	n.d	0.03	2	mg/kg
Methidathion	n.d	n.d	n.d	n.d	n.d	0.04	0.2	mg/kg
Endosulfan	<LOD	<LOD	<LOD	n.d	<LOD	0.02	0.05	mg/kg
DDE+dieldrin	n.d	n.d	n.d	n.d	n.d	0.02	-	mg/kg
Endrin	n.d	n.d	<LOD	<LOD	n.d	0.02	0.01	mg/kg
DDD	n.d	n.d	n.d	n.d	n.d	0.02	-	mg/kg
Endrin aldehyde	n.d	n.d	n.d	n.d	n.d	-	-	mg/kg

Table 149:  
Test results for the presence of pesticide residues in samples of plums (Nježić, 2006)

Tested chemical compounds	Detected					LOD	EU MRL for plums	Unit of measure
	Sample1	Sample2	Sample5	Sample6	Sample7			
Endosulfan sulfate	n.d	n.d	n.d	n.d	n.d	0.08	-	mg/kg
DDT	<LOD	n.d	<LOD	<LOD	n.d	0.02	0.05	mg/kg
Bifentrein	n.d	n.d	n.d	n.d	n.d	0.03	0.2	mg/kg
Cypermethrin	<LOD	<LOD	<LOD	<LOD	<LOD	0.1	1	mg/kg

NOTE: n.d. -not detected; LOD-limit of detection; MRL- maximum allowed concentrations

### 2.3.9.6 Waste management monitoring

The basis for monitoring the amounts and content of waste is the *Law on Waste Management of FBiH* (Official Gazette of FBiH, No. 33/03, 72/09), the *Law on Waste Management of RS* (Official Gazette of RS, No. 111/13) and the *Law on Waste Management of BD* (Official Gazette of BD, No. 25/04, 1/05, 19/07, 2/08 and 9/09).

Bylaws governing the disposal of waste containing polychlorinated biphenyls (PCBs) and polychlorinated terphenyls (PCT) have not yet been adopted in FBiH, RS or BD. According to the definition of the Basel Convention, industrial waste containing hazardous chemical compounds such as PCBs and PAHs is defined as hazardous waste.

The disposal of electrical and electronic equipment (which may contain PCBs, polybrominated diphenyl ethers (PBDEs) and perfluorooctane sulfonate (PFOS)) in FBiH is governed by the *Regulation on Management of Waste from Electrical and Electronic Products* (Official Gazette of FBiH, No. 87/12). Pursuant to Article 3, paragraph 3 of this Regulation, the subjects included in the system of managing electrical and electronic (EE) waste are the manufacturers, importers, distributors, collectors, end users, operators of EE waste management systems and the Environmental Fund of FBiH, which is a legal entity with public authorities performing activities related to the organization of EE waste management. The Regulation specifies the responsibilities of each of these subjects in the management of EE waste, and provides the classes of EE equipment and the list of classified products in its Appendices 1 and 2.

Pursuant to the above-mentioned laws and the bylaws adopted on the basis of these laws, the owner (producer) of waste is responsible for waste monitoring, and submitting all information on the results of monitoring, the impacts on health and the environment, as well as any possible accident situations, to the ministries in FBiH, RS and BD in charge of environmental protection. In the publicly available reports and statistical yearbooks there is no information on the results of monitoring of hazardous chemical compounds in waste. The statistical yearbooks of FBiH and RS provide only data on the total annual generation of waste containing PCBs (Table 150).

*Table 150:*  
Total generation of waste containing PCBs in 2011

Entity	Annual generation of waste containing PCBs	Source of data
Federation of BiH	23 tons	Statistical Yearbook of FBiH for 2012
Republika Srpska	1 ton	Statistical Yearbook of RS for 2012

### 2.3.9.8 Human exposure to POPs and health effects

Pursuant to the *Law on Health Care in FBiH* (Official Gazette of FBiH, No. 46/10), the *Law on Health Care in RS* (Official Gazette of RS, No. 106/09) and the *Law on Health Care in BD* (Official Gazette of BD, No. 38/11 and 9/13), the Public Health Institute of FBiH and the Public Health Institute of RS are required to, inter alia, examine, monitor, analyse and evaluate the impact of environmental factors on human health, and to propose measures to prevent their adverse effects and participate in the implementation of such measures. On the basis of the *Law on Health Records* (Official Gazette of FBiH, no. 37/12) and the *Law on Records and Statistical Surveys in Health Care* (Official Gazette of RS, no. 53/07), analytical laboratories in the public and private sector that can monitor various toxic substances in environmental media, including POPs, need to report to the Public Health Institute of FBiH and the Public Health Institute of RS on results of tests and determined values. Public Health Institute of FBiH and the Public Health Institute of RS should publish the results in annual publications on the health status of the population in FBiH and RS. Chapter 2.3.14.2 gives an overview of the data which are published in the mentioned publications.

Pursuant to Article 3 of the *Regulation on the Implementation of the Food Monitoring Plan* (Official Gazette of BiH, No. 21/11), the general objectives of the Food Safety Agency of BiH include the determination of the amounts and trends of pollutants, additives, nutrients, GMOs, microbiological criteria and other ingredients in the food placed on the market of BiH, as well as the assessment of the intake of the ingredients and substances defined in the Regulation into the human organism.

During the inventory development, the Environment, Health, Research and Development Group identified a lack of a whole range of relevant data on the content of certain POPs in the air, surface and ground water, food and drinking water, which represents the starting point for risk assessment.

Furthermore, there is a lack of information on the average composition of meals that could be used to calculate the daily/monthly or annual intake of certain POPs. Similarly, the Environment, Health, Research and Development Group was unable to obtain data on the determination of the presence of certain POPs in body fluids and human biological materials. All this hinders the assessment of exposure, which is one of the prerequisites for risk assessment.

### 2.3.9.8 Conclusions

In BiH, there are institutions and normative acts at the level of state, entity and Brčko District, with an additional cantonal level in the Federation of BiH, that are to some extent involved in issues related to persistent organic pollutants, and monitoring of their concentrations in the environment, i.e., in the air, drinking water, surface water, biome, agricultural land and soil, and waste. In addition, there is a whole range of laws and bylaws that regulate issues more or less related to the Stockholm Convention. This demonstrates that the necessity and obligation to preserve the environment and care for nature and health are indeed recognized in BiH. It is particularly significant that almost all the laws mentioned here prescribe, in some manner, transparency and accessibility of information, which speaks of the recognition of the role and importance of the structure of civil society, non-governmental organizations and citizens in general.

However, during the analysis of regulations and particularly the monitoring results obtained, the Environment, Health, Research and Development Group identified significant shortcomings that need to be addressed. This primarily refers to the laws and bylaws that are in the process of drafting and adoption.

Following an examination of the documents presented above by the Environment, Health, Research and Development Group, the Group identified a complete lack of normative acts regulating the monitoring of POPs concentrations in the biome and appointing the institution responsible for the implementation of such monitoring.

Furthermore, the Environment, Health, Research and Development Group found that, even though transparency of work is prescribed by almost all normative acts, publicity of data is still questionable and the results of monitoring are in some cases not published in the manner provided for by normative acts.

The Environment, Health, Research and Development Group ascertained that the majority of normative acts fail to specify the sampling method, which is exceptionally important for testing the presence of POPs in surface and ground waters. Based on the results of monitoring of their concentrations submitted by the institutions, the sampling method cannot be determined, which may be suitable in case of accidental situations, but is not entirely applicable in case of continuous monitoring. The bylaws governing the monitoring of POPs concentrations in water and air should be amended to include not only the request and methods for determining the concentration of substances listed under the Stockholm Convention, but the sampling methods should also be adapted.

During the inventory development, the Environment, Health, Research and Development Group concluded that the capacity of institutions in BiH to conduct analysis and monitoring are inadequate. In cases where a particular type of monitoring is regulated by a certain bylaw, such a bylaw usually requires the laboratory conducting the monitoring to be certified in accordance with international standards (ISO 9000, ISO 14000 and in particular the laboratory itself and the methods in accordance with ISO 17025).

Based on the above-mentioned analysis of the references, available data and data obtained during the development of the inventory, the Environment, Health, Research and Development Group concluded that:

- there is no systematic monitoring of chemicals listed under the Stockholm Convention in the air, groundwater, food, sediment/soil in BiH;

- assessment of the effects of POPs on human health is not carried out in BiH, and
- there are no relevant studies to collect information on the exposure of the population as a whole, on the exposure of certain target groups (e.g., infants, on the basis of the determination of POPs in breast milk) or the impacts on certain vulnerable groups which are, due to their lifestyle, financial situation or profession, more susceptible to the effects of POPs.

In addition, there have been no conducted studies, and the Environment, Health, Research and Development Group was unable to obtain data that would represent the basis for risk assessment of the effects of POPs not only on humans but also to ecosystems.

### **2.3.10 CURRENT LEVEL OF INFORMATION, AWARENESS AND EDUCATION AMONG TARGET GROUPS; CURRENT MECHANISMS OF INFORMATION DISSEMINATION AMONG TARGET GROUPS AND AMONG PARTIES TO THE CONVENTION**

The environmental laws of FBiH, RS and BD state that every individual and organization have the opportunity to participate in the decision making process. Laws oblige regulatory bodies and public authorities to facilitate and stimulate public awareness and participation by making information available to the public. The laws also guarantee effective access to judicial and administrative proceedings, including redress and compensation.

Definitions of environmental information, limit to their access and other provisions of the entity laws generally comply with the provisions of the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters (the so-called Aarhus Convention, to which BiH acceded in 2008). The same applies to provisions for public participation and access to justice. In 2011, the *First National Report on the Implementation of the Aarhus Convention in BiH* was prepared, with the participation of close to 30 ministries and institutions, including three non-governmental organizations.

Currently at the national level there is no central database for the environment, nor is there information system of environmental protection that is implemented and deployed. Various institutions monitor, collect and process data, but without adequate vertical or horizontal communication.

Protocol on Pollutant Release and Transfer Registers (PRTR) are prepared in the ministries responsible for the environment in FBiH and RS, while the EU/CARDS project in 2007 provided the hardware and software. FBiH and RS have adopted regulations on the registration of plants and pollutants. Companies have since 2008 required to disclose, while environmental inspectors have the right to sanction the company and their administration if it does not comply with the regulations.

Although the European Environment Agency (EEA) and the European Environment Information and Observation Network - EIONET cooperate with Bosnia, still no adequate coordination mechanism was established with clear authority and a clear delineation of responsibilities and obligations between the state, entities, cantons and municipalities. This is the main prerequisite for the efficient functioning of information systems for the environment in FBiH, RS and BD. BiH delivers about 65% of the requested data to the European Environment Agency (UN Economic Commission for Europe, 2011).

#### **2.3.10.1 Institutional capacities**

There are very few formal mechanisms for the transfer of data and information between institutions dealing with the environment in the two entities and the Brcko District. Most of the exchange is voluntary. The only bodies that provide a form of homogeneity in the collection and presentation of data are the Institutes of Statistics of both entities and the Agency for Statistics of Bosnia and Herzegovina (MoFTER, State of the Environment Report of BiH 2012).

Due to the unclear demarcation of responsibilities and obligations between the state, entities, cantons and municipalities in BiH there is no systematic environmental monitoring and reporting system. Relevant institutions lack vertical (entity/cantonal/municipal) and horizontal (inter-entity/inter-ministerial/inter-municipal) cooperation. In addition, the government is often unable to cope with the international obligations and numerous environmental agreements

(e.g., fulfillment of obligations related to reporting, appointment of national focal point (the executive body) and the performance of duties relating to monitoring). Complex public administration leads to poor identification of responsibilities, duplication of tasks and inefficiencies.

### 2.3.10.2 Raising environmental awareness

The environmental laws of FBiH, RS and BD state that every individual and organization have the opportunity to participate in the decision making process. Regulatory bodies and the authorities are obliged to encourage public awareness and participation, help in accessing information, recourse through judicial and administrative proceedings as well as registers of plants and pollutants in the future. At the state level, entities and cantons, public bodies responsible for environment undertake activities to raise public awareness on environmental issues and the rights of citizens to environmental protection. The environmental laws of FBiH, RS and BD also require to establish an advisory council for the environment. To establish a broad basis for environmental protection, laws on environmental protection require the establishment of advisory councils for the environment that will help the ministries responsible for the environment and entity governments. Councils shall consist of a variety of stakeholders, including environmental associations, organizations and institutions representing professional and economic interests and scientific circles. Councils are expected to be actively involved in the evaluation of strategic environmental assessments, plans and programs relating to the environment. However, entities have not progressed in establishing such councils.

The public has the possibility of actively participate in the processes of issuing environmental permits, particularly in terms of projects that are subject to environmental impact assessment (EIA). According to the entity laws on environmental protection, the entity ministries of environment (or in the case of FBiH, cantonal authorities) invites through their website NGOs and the local community to participate in the issuance of licenses three months in advance. Non-technical summaries of EIA are published for public use. Date of the public hearing is published 30 days in advance. Entity ministries responsible for the environment, along with investors, organize public debates, but only the competent entity ministry of environment compiles a report on the public debate. Investors are required to respond to comments made by members of the public at a public consultation event, through the Entity Ministry of Environment (or cantonal authorities), within 15 days. Around 20 NGOs are regularly included in the EIA in the country.

In BiH, formal education takes place at three levels: compulsory nine-year elementary, three-year or four-year secondary education and higher education that takes place after tricyclic Bologna principle 3 + 2 + 3 (3 years for the degree- Bachelor, second degree 2 years - master and third degree three years - a Ph.D.) or 4 + 1 + 3 (4 years for the degree of Bachelor, one year for master and three years for the degree of Doctor of Sciences). It should be added that is pre-school education compulsory for all children of preschool age under the Framework Law on Preschool Education. The curricula for preschool children and for schools now include elements about the environment, thanks to the adoption of a series of law<sup>107</sup>s and strategies<sup>108</sup>. Plans and programs for pre-school institutions in BiH include elements aimed at developing an awareness of the importance of protecting and preserving the natural environment, as well as the involvement of children in activities to preserve the environment. In primary schools, within the course «My Environment» children handle first topic in the field of the environment, and later in other subjects, such as biology, nature, physical and health education, etc. Through these subjects, children are provided knowledge about environmental conservation, environmental problems, the importance of personal contribution to the environment, ecology, and is taking steps to develop environmental awareness and environmental protection. In secondary schools are also topics of ecology and environmental protection. Unfortunately, in the preparation of this project, members of the group for the inventory of these chemicals have not been able to get information about how POPs substances are covered during school activities, nor whether children and students are familiar with POPs chemicals and their effects on human health and the environment.

In higher education, several universities have introduced curricula for the environment.

107 Framework Law on Primary and Secondary Education (Official Gazette of BiH, nr. 18/03)  
Framework Law on Pre-school Education and Upbringing (Official Gazette of BiH, nr.88/07)  
Law on Secondary Vocational Education Training in BiH (Official Gazette of BiH, nr.63/08)

108 Strategy for Advancement of Education in BiH, adopted at Council of Ministers in 2008, covering a period of 2008-2015;  
Vocational Education Training Strategy in BiH, adopted in 2007, covering 2007 to 2013; Higher Education Strategy in BiH,  
adopted in 2007; and Strategy for Pre-school Education and Upbringing in BiH, adopted in 2004.

Regarding programs of education which are not cycle-based<sup>109</sup> and that can be subsumed under academic specialization, it is certain that universities in BiH do not currently provide any programs that would enable learners to acquire knowledge, skills and competencies that relate to the Stockholm Convention or the management, control and monitoring the concentration of POPs chemicals in living organisms and the environment<sup>110</sup>.

Public institutions conduct professional trainings in the field of environment for the staff of institutions, entrepreneurs and representatives of non-governmental sector.

Regional Environment Centre for Central and Eastern Europe is implementing a program "Education for Sustainable Development (ESD) in the Western Balkans", which aims at supporting the implementation of reforms in the education sector as well as strategies for sustainable development in the Western Balkans through the development, implementation and dissemination of ideas on sustainable school at the elementary school level. The following areas are priorities of this program: teacher education; curriculum design, including extracurricular activities and preparation of educational materials; campaign to raise public awareness on education related to environment/sustainability; improving participation and cooperation in order to exchange experiences and to define best practices and approaches to education related to environment/sustainability. The purpose of the Program is to improve the practice of sustainable development in schools and communities in Bosnia and Herzegovina, Montenegro and Serbia, as well as the Western Balkans.

Furthermore, the Regional Environmental Centre for Central and Eastern Europe implemented in 2000 environmental education and sustainable development education program called "Green Pack" for schools in BiH.

Non-governmental organization COOR Sarajevo significantly contributes in the field of education for sustainable development. In the period 2005-2007, it implemented a project "Strengthening of Environmental Awareness", funded by the EU CARDS program. The project included the educational sector, and working with the media and NGOs to promote awareness about the environment in their field of work. Between 2005 and 2013, they implemented a series of projects in the field of education for sustainable development targeting school population in virtually all parts of BiH, with the aim of raising awareness among young people about the environment and sustainable development.

### 2.3.10.3 Public information tools and mechanisms

In accordance with environmental legislation in FBiH, RS and BD, all regulatory bodies and public authorities are obliged to make environmental information available to the general public and publish them in print and electronic form, in easily accessible format. The laws explicitly stipulate that the Ministry of Environment should actively disseminate environmental information in a continuous, transparent and effective manner. Ministries are required to further analyze and evaluate the state of the environment and its protection, and what they learned from their experience in the protection, use and development of the environment.

State of the Environment Report in Bosnia and Herzegovina 2012, adopted in 2013 by the Council of Ministers of Bosnia and Herzegovina is the first State of the Environment Report of Bosnia and Herzegovina which is one of the fundamental documents of environmental protection in BiH. Besides being one of the important foundations for environmental assessment in future negotiations for access to the EU, the report will serve as a reference in decision making for sustainable environmental management in BiH and contribute to decisions that will be based on scientific methods.

The report is based on the current available data on sectoral pressures and the environment, collected from all relevant existing sources. A particular challenge for the preparation of the report was the lack of a large number of data and indicators to create a comprehensive picture of the state of the environment in BiH. Therefore, the first report showed that to have a comprehensive consideration of environmental issues in BiH, the authorities in Bosnia and Herzegovina should pay particular attention to capacity building for missing data collection about the environment, and improve the reliability and consistency of data and indicators contained in the reports about the environment.

<sup>109</sup> Non-cycle based education represents a type of education which ensures that interested persons may continue their education through courses, seminars and other types of education, resulting in a certificate.

<sup>110</sup> If one searches the Internet using terms „specialisation“, „environment“, „Bosnia and Herzegovina“, the internet does not provide any results that would lead to the conclusion that such programs exist. Also, looking at the webpages of private universities that offer undergraduate study programs that may be in any way connected to the environment (biology, chemistry, chemical technology, and mechanics) also did not show results that would confirm that such specialized programs would exist. As POPs project did not foresee an inventory of curricula of both public and private universities in BiH, additional activities were not implemented)



Contrary to the recommendations of the European Process for Environment and Health, BiH does not publish reports on the environment and health that showcase a link between pollution and health. Moreover, the websites of the entity ministries of health do not publish information about environment-related health information. This ministry just publishes newsletters on the epidemiological situation in the entities.

Agency for Statistics of BiH has improved data on the statistics of the environment, to be published in national statistical yearbooks. This institution is currently developing a statistical form for collecting data on costs, revenues and investments in environmental protection. The state statistics agency and entity statistics institutes publish statistics about the environment on their websites. Entity Statistics Institutes do not issue publications.

BiH media, including print and electronic media are not paying enough attention to environmental issues. There are several media that periodically publish information about the environment, within certain TV<sup>111</sup> and radio programs<sup>112</sup>, and thematic papers<sup>113</sup> in this field.

#### **2.3.10.4 Publicly available information about POPs**

In BiH, information on POPs and their impact on people and the environment are underrepresented among the average population. Current information and training programs are not sufficient, and they need additional programs for target groups.

So far, no measures, such as public awareness campaigns, were taken to inform the public about POPs. The text of the Stockholm Convention is published on the website of the Ministry of Foreign Trade and Economic Relations of BiH, and the Aarhus Centre in BiH also periodically publishes information on POPs on its website. In addition, there are no other publicly available information on POPs.

#### **2.3.11 REPORTING MECHANISMS ACCORDING TO ARTICLE 15 ON MEASURES UNDERTAKEN TO IMPLEMENT THE PROVISIONS OF THE CONVENTION AND EXCHANGE INFORMATION AMONG PARTIES TO THE CONVENTION**

Pursuant to Article 9 of the *Law on Ministries and other Administrative Bodies of BiH* (Official Gazette of BiH, no. 03/05, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59 / 09 and 103/09), the Ministry of Foreign Trade and Economic Relations of BiH is responsible for performing the assigned tasks relating to the definition of policies, basic principles, coordinating activities and harmonizing plans of the Entity authorities and institutions at the international level in the fields environmental protection, development and use of natural resources.

In accordance with the conclusions of the Council of Ministers "On the regulation of institutional and organizational infrastructure for environmental management and GEF programs in BiH," the 66<sup>th</sup> session of the Council of Ministers decided on 16 May 2002 that the Ministry of Foreign Trade and Economic Relations of BiH is the focal point in BiH for coordination of cooperation with international structures and bodies of the Stockholm Convention.

In the Action Plan, in the sections relating to information sharing and reporting, a proposal was made as to the organization and functioning of the mechanism for the exchange of information and reporting to the Secretariat of the Convention.

#### **2.3.12 RELEVANT ACTIVITIES OF NON-GOVERNMENTAL INTEREST GROUPS**

In BiH there are numerous non-governmental organizations dealing with environmental issues, which define themselves as citizens' organizations or associations of professionals in the field of environment. Raising environmental awareness and education are constantly their main activities. Registration and activities of NGOs in BiH are regulated by the state and entity laws on associations and foundations, non-governmental organizations which provide a wide range of rights (e.g., can initiate legal proceedings, NGOs from one entity can act in the other entity, and the like). Activities of NGOs in BiH are mainly focused on education and awareness, and their participation in the activities of the working groups in various bodies

111 BiH TV, Federation TV, RS radio and TV, Hayat mreža Plus, OBN, Pink BiH

112 Radio BiH, Radio FBiH, RS Radio (RTRS), Radio Herceg-Bosna, Bosanska Radio Mreža (BORAM), BM Radio, Radio Stari Grad (RSG)

113 Oslobođenje, Dnevni avaz, Nezavisne novine, Glas Srpske, Dnevni list, Dani, Slobodna Bosna, Novi reporter, Fondoko Svijet

of government, and creation and implementation of environmental policy at a low level. NGOs regularly participate in public debates during the preparation of environmental impact assessment studies (eg. for the construction of roads, hydropower, etc).

Office of the Regional Environment Centre for BiH (BiH REC) was established in March 1997 with the aim to provide adequate support to improve the protection and conservation of the environment in BiH. So far, BiH REC worked to promote dialogue among the various stakeholders (government sector, research organizations, industry, NGOs, the media and others.) Bearing in mind the political circumstances, all activities of BiH REC are implemented in both Entities (Federation of Bosnia and Herzegovina, Republika Srpska) and Brcko District.

Given the very specific situation in BiH, decentralization and the relationship between the two entities, REC has also established offices in Banja Luka (1998) and Mostar (2000).

Office of the Regional Environment Centre (REC), gives support to non-governmental organizations (NGOs) through the following activities:

- Exchange of information (newsletters, NGOs manuals, brochures, etc.);
- Strengthening capacity through training (abroad and in Bosnia and Herzegovina);
- Financial support to NGO projects.

To support the implementation of the Aarhus Convention in Bosnia, the first Aarhus Centre in BiH was founded in 2012. Significant activities of the Aarhus Centre include publishing the first comprehensive manual on the application of the Aarhus Convention in BiH, and publishing a national online platform on the Convention ([www.aarhus.ba](http://www.aarhus.ba)), where it publishes updated content about the work of relevant bodies and non-governmental organizations. In addition, the Aarhus Centre provides assistance in obtaining environmental information from the authorities, facilitation of public participation in decision making, providing basic legal advice and interpretation of regulations, policies and mechanisms for access to justice in accordance with the Aarhus Convention, as well as access to more than 300 publications to students, researchers and the public, free internet access and free space for meetings and seminars for NGOs who are engaged in similar activities. In April 2013, under patronage of the OSCE Mission in Bosnia and Herzegovina a network of Aarhus Centres in BiH (Sarajevo AC, AC Banja Luka and Tuzla AC) was established.

According to the director of environmental NGO in 2006 (leading REC), there are 87 registered and one unregistered non-profit organization in the field of the environment, with a total of 54,628 members in BiH, of which 222 members employed full or part time. The annual budget of NGOs in the field of environment in BiH amounted to 1.761 million Euros (Regional Environmental Centre BiH, 2006).

Website Aarhus Centre in BiH also contains a database of NGOs active in the field of environment, which is updated in collaboration with the Network of Aarhus Centres in BiH.

A good indicator is that the public interest in nature and the environment is growing and the support to active NGOs is increasing, as well as their number. However, the movement of NGOs in the environmental field is still in its early stages, and therefore the external support and assistance of great importance. Most NGOs need basic support such as training on proposal writing, project management and finance, as well as support in the form of office and technical equipment; but, above all, they need funds to implement projects in the environmental field.

### **2.3.13 OVERVIEW OF THE TECHNICAL INFRASTRUCTURE FOR POPs ASSESSMENT, MEASUREMENT, ANALYSIS, ALTERNATIVE AND PREVENTIVE MEASURES, MANAGEMENT, RESEARCH AND DEVELOPMENT (LINK WITH INTERNATIONAL PROGRAMS AND PROJECTS)**

#### **2.3.13.1 Introduction**

Within the inventory of POPs in Bosnia and Herzegovina, the Environment, Health, Research and Development Group performed an analysis of the technical infrastructure<sup>114</sup> for the assessment, measurement and analysis of POPs substances, as well as management, research and developmental capacity in BiH. The analysis methodology is described in detail in Annex 6.

<sup>114</sup> Facilities and equipment used for measurement, analysis and assessment of POPs.

A single class of POPs may contain a large number of chemicals and their specific isomers which represent a challenge to the contemporary analytical methods, when it is necessary to carry out their detailed characterization and quantification. On the other hand, due to their high toxicity, POPs must be determined in very low concentrations, in complex environmental samples, whereby the sensitivity of the method (expressed as detection limit) generally cannot be below 10 parts per billion (10 ppb).

The Environment, Health, Research and Development Group has determined, based on interviews with experts from the Norwegian Institute for Water Research (Norsk institutt for vannforskning - NIVA) that laboratories with the capability to assess POPs must be exceptionally well-equipped with equipment that is suitable for:

- the extraction of substances in traces from solid samples (accelerated solvent extraction),
- the purification of liquid samples and extracts and preparing them for analysis (solid phase extraction, preparative size-exclusion chromatography),
- the determination of trace concentrations of organic materials in ppt and ppb levels, including active and passive sampling systems,
- specific systems for trace element over-concentration; should have standards and standard reference materials, quality assurance systems and proper protection systems for the laboratory studies, when working with extremely toxic substances such as PCDD, with highly qualified staff and the application of quality assurance measures.

These measures imply that the analysis is carried out in accordance with the principles of Good Quality Control Laboratory Practice<sup>115</sup> and that the laboratory has ISO 17025<sup>116</sup> certificate. Polychlorinated and polybrominated dibenzodioxins and dibenzofurans are extremely toxic substances; therefore, a laboratory dealing with determining such substances must meet additional security requirements, in order to protect employees who are working in the laboratory, as well as to ensure proper disposal of laboratory waste.

The organization of laboratories which could provide valid results in the analysis and monitoring of POPs is an extremely complicated process, which requires continuous engagement of socio-political communities, secured funding and continuous training of staff.

### 2.3.13.2 The existing capacities

Based on the analysis data on capacities for monitoring POPs, collected in the process of inventory development, the Environment, Health, Research and Development Group has established that the current monitoring of POPs in the environment in BiH is performed in two ways:

- Institutionally, through the authorized institutions (Table 145), which are specified in the relevant laws and by-laws, i.e. laboratories approved by the competent institutions for such monitoring;
- Non-institutionally, through periodic monitoring carried out through the implementation of scientific research projects, mostly in cooperation with foreign partners. These projects are mainly implemented through higher education and scientific research institutions.

#### Institutionally organized monitoring

The first type implies that the socio-political community (state, entity, canton), on the basis of the adopted monitoring program for certain pollutants, hires certified laboratories that are financed from the budget, and due to the complexity of the tasks performed, such monitoring is carried out as part of their regular work obligations for which they were formed and trained. The institutions responsible for monitoring the environment and the effects of pollution on the health of people in BiH, are listed in Table 145 within *Chapter 2.3.9 Existing programs for monitoring and the impact on the environment and health*.

In addition, for monitoring POPs in the environment, the institutions responsible for monitoring the environment and the effects of pollution on the health of people in BiH, may also engage private laboratories, which meet the requirements of space, equipment and staff, so as to obtain certification from the national certification agency (in the case of Bosnia

<sup>115</sup> Set of guidelines for proper quality assurance which provides organizational processes and conditions under which laboratory studies are planned, performed, monitored, recorded, reported and archived.

<sup>116</sup> Standard which provides general requirements for the competence of testing and calibration laboratories

and Herzegovina, it is the Institute for Accreditation of BiH, BATA, pursuant to the *Law on Accreditation of Bosnia and Herzegovina* (Official Gazette of BiH, no. 19/01), Article 6) in order to perform a proper analysis.

Table 151 provides an overview of laboratories in Bosnia and Herzegovina which are, based on the report of the Institute for Accreditation of BiH (BATA), accredited for analyzing the substances on the list of the Stockholm Convention (as of 5 May 2014).

**Table 151:**  
*List of laboratories that are accredited for examining POPs in BiH (Source: Institute for Accreditation of BiH - BATA)*

Name of accredited conformity assessment body		Scope of accreditation	Standard or regulation	Number and date of accreditation	Number of supplement revision and date
Institute for Water, Ltd. Bijeljina		Field: Chemistry, biology, microbiology, sampling and measurement of water flow and temperature Scope: Testing of raw, surface water, groundwater, waste water and drinking water	BAS EN ISO/IEC 17025	LI – 28 – 01 Dec 23, 2012	Revision 0n Dec 23, 2012
No.	Material	Type of test		Measuring range	Methods/ specifications
1	All types of water	Polycyclic aromatic hydrocarbon content		> 0.1 µg/l	EPA 550.1: 1994
2	Drinking water, surface and groundwater	Organochlorine pesticide content		0.01- 1.0 µg/l	EPA 508.1:1994
SUSTAV QUALITA, S d.o.o. – OJ Testing laboratory Pale		Field: Chemistry Scope: Testing of liquid fuels, water and waste water, alcohol, animal and agricultural products	BAS EN ISO/IEC 17025	LI – 14 – 02 2004-05-20 2008-05-20 2012-05-20	Revizija 1 2013-12-27
No.	Material	Type of test		Measuring range	Methods/ specifications
1.	Drinking water, waste water, bottled water, surface water and spring water	The content of organochlorine pesticides:  HCH - alfa HCH – beta HCH – gama HCH – delta  Heptachlor Aldrin Heptachlor epoxide Endosulfan Dieldrin  4,4 DDE Endrin Endosulfan II 4,4 – DDD  Endrin aldehyde Endosulfan sulfate 4.4 - DDT Methoxychlorine		(0.01 do 1.0) µg/l LOD: ≥0.0002 µg/l ≥0.0008 µg/l ≥0.0002 µg/l ≥0.0003 µg/l  ≥0.0003 µg/l ≥0.0003 µg/l ≥0.0001 µg/l ≥0.0001 µg/l ≥0.001 µg/l  ≥0.00005 µg/l ≥0.0004 µg/l ≥0.0004 µg/l ≥0.00004 µg/l  ≥0.0003 µg/l ≥0.00004 µg/l ≥0.0002 µg/l ≥0.0007 µg/l	EPA Method 508 - 1:1994 Rev. 2.0
“Federal Agro-Mediterranean Institute” Mostar - Testing laboratories		Field: Physical and chemical testing of agricultural products and animal products, alcohol and alcoholic beverages, soil and fertilizers	BAS EN ISO/IEC 17025	LI-45-01 2012-07-23	
No.	Material	Type of test		Measuring range	Methods/ specifications
1.	Milk and milk products	Determination of organochlorine pesticides (alpha-HCH, HCB, beta-HCH, lindane, heptachlor, aldrin, o, p-DDE, endosulfan, alpha, p, p-DDE, p, p-DDT, o, p-DDT, p, p-DDT)		0.010 mg/kg to 100 mg/kg	Internal method (GC)

### Non-institutional monitoring

The second manner of performing monitoring in BiH is through scientific research institutes located at universities and higher education institutions, public or private. Normally, these institutions conduct monitoring within scientific research projects which are mainly financed through foreign projects.

Based on the monitoring data in BiH, the Environment, Health, Research and Development Group has determined that five such scientific research projects in BiH (Table 152) have been implemented in the past thirteen years, which, in addition to obtaining data on certain

POP content, have contributed to the strengthening of the scientific research capacity of institutions, which were local partners to these projects in BiH, and the training and education of staff. The projects in question are listed chronologically, according to the time period in which they were realized.

No.	Name of project	Foreign partner	Local partner	period of implementation
1.	APOPSBAL - Assessment of the selected POPs (PCBs, PCDDs/Fs, OCPs) in the atmosphere and water ecosystems from the waste materials generated by warfare in former Yugoslavia (RECETOX 2013)	RECETOX, Masaryk University Brno, Kamenice 126/3, 625 00 Brno, Czech Republic	Federal Institute for Geology - Sarajevo, Ustanička 11, 71210 Ilidža, BiH	2001-2003
2.	Persistent Pollutants in Rivers in Bosnia and Herzegovina	Norwegian Institute for water Research (NIVA), Oslo	Faculty of Pharmacy, University of Sarajevo, BiH	2006-2009
3.	Capacity building for local implementation of the Stockholm Convention in BiH (BiHNoPOP).	Norwegian Institute for water Research (NIVA), Oslo	Faculty of Pharmacy, University of Sarajevo, BiH	2009-2011
4.	Development of a Decision Support System for Reducing Risk from Environmental Pollution in the Bosna River (Overview of Ongoing Multy-Year Science for Peace Projects, 2011)	Slovak Water Research Institute (WRI) Bratislava	Hydro-Engineering Institute of Civil Engineering Faculty, University of Sarajevo	2011-2014
5.	'Cooperation and capacity building on implementation of the Stockholm convention in BiH	Norwegian Institute for water Research (NIVA), Oslo	Faculty of Pharmacy, University of Sarajevo, BiH	2012-2014

*Table 152:  
List of implemented scientific research projects that were related to the investigation of the presence of POPs in the environment in Bosnia and Herzegovina*

Due to lack of technical capacity in Bosnia and Herzegovina, the analytical tasks envisaged for the implementation of the above mentioned projects could not be completed entirely in BiH, such as the analysis of polybrominateddiphenyl ether (determination of individual congeners), the determination of PAHs, the determination of PCB congeners, and the partner institutions have played a crucial role in the monitoring and the implementation of the projects.

The following laboratories were trained for determining PAHs, PCBs and the organochlorine pesticides in the framework of the implementation of above mentioned projects:

- Laboratory of the Hydro-Engineering Institute of Civil Engineering Faculty at the University of Sarajevo;
- Laboratory of the Faculty of Pharmacy at the University of Sarajevo;
- Laboratory of the Institute of Protection, Ecology and Informatics in Banja Luka.

According to the information on the type of monitoring performed by these laboratories, which was, within the framework of the inventory, collected by the Environment, Health, Research and Development Group, it is expected that in these laboratories, in the coming period, through the implementation of the projects that are still in progress (Table 152 – under 4 and 5), it will be possible to carry out other types of analysis, such as analysis of other substances specified in the Annexes to the Stockholm Convention: PFOS, PCDD and PCDF, some substances that are expected to be included in the list of the Stockholm Convention such as hexabromocyclododecane.

### 2.3.13.3 Conclusions

The Environment, Health, Research and Development Group has concluded that in BiH, there is a substantial lack of capacity and technical infrastructure for monitoring the concentration of POPs in the environment due to the fact that on the list of accredited bodies, the Institute for Accreditation of BiH (BATA) mentions only one institution that has been accredited for the analysis of organochlorine pesticides. Even though in BiH there are scientific research institutions that have the staff and part of the equipment, such as gas chromatographs, necessary for conducting monitoring of POPs, these institutions lack the competence of testing and calibration laboratories BAS EN ISO/IEC 17025, accredited by the corresponding accreditation body, the Institute for Accreditation of BiH (BATA).

At the time of inventory development (May - November 2013), only the Water Institute in Bijeljina was accredited for BAS ISO/IEC 17025, specifically for determining organochlorine

insecticides in drinking water, surface water and groundwater, and polycyclic aromatic hydrocarbons in all types of water. Polycyclic aromatic hydrocarbons are not listed under the Stockholm Convention, even though they belong to POPs in essence. In the meantime, two more laboratories for determination of organochlorine insecticides and PCBs in milk, drinking water, waste water, bottled water, surface and spring waters (System Qualita S d.o.o. Testing Laboratory Pale and Testing Laboratory of the Federal Agro-Mediterranean Institute Mostar) have been accredited<sup>117</sup>, but this is still insufficient and significantly below the average of the countries of the region. The currently applied test methods and sampling methods carried out in these institutions provide only information on the current situation and short-term contamination.

### **2.3.14 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**

During the development of the inventory of POPs in BiH, the Environment, Health, Research and Development Group was unable to find information about the systematic research on the impact of POPs compounds on human and environmental health, nor could they find any published results related to the systematic and continuous monitoring of these compounds in soil and sediment, air, water, waste, biome and food in BiH. The methodology of analysis is described in detail in Annex 6. The results of monitoring carried out by the institutions responsible for monitoring environmental conditions and the effects of pollution on the health of people in BiH are presented in *Chapter 2.3.9 Existing programs for monitoring and the impact on the environment and health..*

The only data the Environment, Health, Research and Development Group was able to collect are those obtained through the implementation of the following international projects:

- Project APOPSBAL – “Assessment of selected POPs (PCBs, PCDDs/Fs, OCPs) in the atmosphere and water ecosystems from waste materials generated by warfare in former Yugoslavia” (Research Centre for Toxic Compounds in the Environment – RECETOX and Federal Institute for Geology - Sarajevo), 2001 – 2003 financed by the European Union within the Fifth Framework Programme for Research and Technological Development (FP5);
- “Persistent Pollutants in Rivers in Bosnia and Herzegovina” (Norwegian Institute for Water Research (NIVA) and the Faculty of Pharmacy at the University of Sarajevo), 2006-2009;
- MONET\_CEEC project (Research Centre for Toxic Compounds in the Environment), 2006.
- Project NATO ESP.EAP.SFP 984073 „ Development of a Decision Support System for Reducing Risk from Environment Pollution in the Bosna River” which is in the final stage of implementation, and the results presented in this report will be presented at the workshop which will be held on April 1 2014 in hotel Integra, Dobo. This project is implemented by Hydro-Engineering Institute of Civil Engineering, University of Sarajevo, in cooperation with the National reference laboratory for water, Bratislava, Slovakia.

The main outcomes of these projects are presented below.

#### **2.3.14.1 POPs in environment**

##### **2.3.14.1.1 POPs in air**

Within the project APOPSBAL in 2004, air sampling was performed at the site of Ivan Sedlo<sup>118</sup> using the passive system with filters of polyurethane foam (PUF). Simultaneously, samples were taken by conventional devices for the collection of large volumes of air. Table 153 shows the results.

<sup>117</sup> <http://www.bata.gov.ba/bapdf/Spisak%20akreditiranih%20tijela.pdf>

<sup>118</sup> Klanova J, Čupr P, Holoubek I, Boruvkova J, Pribylova P, Kareš R and Kohoutek J: Application of Passive Sampler for Monitoring of POPs in Ambient Air, PartV: Pilot study for development of the monitoring network in Central and Eastern Europe (MONET\_CEEC) 2007, Masaryk University Brno 2008, p 69.

Means of sampling	Concentration in air (pg m <sup>-3</sup> )			
	PCB 101	Alfa HCH	p,p'-DDE	Fenantrene
Passive system with PUF	8-15	15-30	10-20	5-11
Conventional system	9	11	9	5

**Table 153:**  
POPs concentrations in air at the locality Ivan Sedlo in 2004

During the project MONET\_CEEC in 2006, POPs samples from air were collected at two locations in Bosnia and Herzegovina: in Banja Luka on the site of the factory Incel, near the storage area of transformers, and in Modriča, on the site of the oil refinery<sup>119</sup>. All samples were collected using a passive system with filters of polyurethane foam (PUF), and were collected during 28 days in five periods during 2006. The results are shown in Table 154, expressed in ng/filter and present the total value of 7 PCB (mixture Dutch 7: PCB 28, PCB 52, PCB 101, PCB 118, PCB 138, PCB 153 and PCB 180), and cumulative values for all four isomers of HCH (aHCH; bHCH, gHCH and dHCH), whilst DDT is expressed as a sum of isomers and metabolites (o,p-DDT; p,p-DDT; o,p-DDD; p,p-DDD; p,p-DDE and o,p-DDE). PAHs that were examined are those on the list of the U.S. EPA.

Analyte	Locality	Min. (ng/filter)	Max. (ng/filter)	Arithmetic mean (ng/filter)	Median (ng/filter)
PCB	Banja Luka	53.5	71.6	63.9	65.3
	Modriča	6.1	23.4	16.0	15.8
HCH	Banja Luka	8.6	23.0	13.9	12.0
	Modriča	20.8	46.5	32.7	30.9
DDT	Banja Luka	0.7	1.5	1.2	1.4
	Modriča	1.3	5.2	3.9	4.3
HCB	Banja Luka	6.3	7.7	6.9	6.8
	Modriča	0.1	6.5	4.6	5.2
PAH	Banja Luka	3,857	5,698	4,636	4,494

**Table 154:**  
POPs concentrations in air at the locality Banja Luka and Modriča in 2006

### 2.3.14.1.2 POPs in river sediments

The Project APOPSBAL was focused on the research of PCB content in river sediments at different locations in BiH as well. Table 155 summarizes the results of the Project APOPSBAL, acquired by the Environment, Health, Research and Development Group. As with the results of PCBs in soil, the Group was unable to obtain detailed information about the location or date of the sampling.

Region	Location	Concentration of PCBs expressed as sum of 7 dutch * ng/g
Sarajevo	River Miljacka	929
	River Zujevina	2,691
Bihać	Fishpond Klokot 2**	361
Tuzla	River Oskova (river mouth)	176
	River Gostilja (Han Nevrenča)	377
	River Gostilja (Živinice)	129
	River Gostilja (near Tuzla)	60
	River Spreča (Puračić)	483
	River Jala (Simin Han)	100
	River Tešanjka	60
	River Usora (near Tešanj)	90

**Table 155:**  
PCB content (ng/g) in river sediments based on the results of the Project APOPSBAL in the period 2002-2005

\*Compound known as 7 dutch contains PCB 28, PCB 52, PCB 101, PCB 118, PCB 138, PCB 153, PCB 180 and PCB 209.

\*\*PCBs were not detected at the spring Klokot 1, which is extremely important, because it is the source of water supply for residents of Bihać. The Environment, Health, Research and Development Group were unable to find studies that would confirm these assumptions.

During 2008 and 2009, the Norwegian Institute for Water Research (NIVA) and the Faculty of Pharmacy of the University of Sarajevo conducted tests on POP content in the sediment from the River Bosna, using the semipermeable membrane devices for passively sampling from water (SPMD) and fish. The findings of the research were published in the paper Harman et al 2013.

The locations where the sediment sampling was conducted are shown in Table 156 and Table 157, indicated as follows:

- ST1 the spring of River Bosna
- ST2 Bosna at the Roman bridge in Sarajevo
- ST3 Semizovac
- ST 4 Bosna at the river mouth Lašva
- ST5 Bosna near Žepče
- ST6-a Bosna near Doboj – upstream
- ST6-b Bosna near Doboj – downstream
- ST6-c mouth of Spreča into Bosna
- ST7 Bosna near Modriča and
- ST 8 Bosna near Bosanski Šamac.

Table 156 shows the published findings (Harman et al 2013) related to certain POP content in sediments from the river Bosna. The results of PCBs are expressed as sum of 7-dutch, and the results of PBDEs as the sum of PBDE 28, 47, 66, 49+71 (they do not separate in the analytical method), 77, 85, 99, 100, 119, 138, 153, 154, 183, 196, 206 and 209.

**Table 156:**  
PCB and PBDE content (ng/g) in sediment from River Bosna, determined during 2008 and 2009 (Harman C et al, 2013)

ng/g	Substance	ST1	ST2	ST3	ST4	ST5	ST6-a	ST6-b	ST6-c	ST7	ST8
PAH substance	Naphthalene	4.83	1.19	11.4	6.35	32	17.2	150	67.3	27.1	44.5
	Acenaphthylene	4.42	0.59	1.41	1.34	21.1	12.8	622	162	85.9	49.4
	Acenaphthen	1.65	4.11	6.58	3.22	36	8.69	2,444	471	354	94.1
	Fluorene	6.01	4.8	11.6	5.97	152	28.2	5,399	670	703	162
	Phenanthrene	46.8	13.9	63.3	25.5	280	196	5,303	1,067	643	428
	Anthracene	11.7	2.47	13.2	4.65	99.1	60.2	2,060	438	202	143
	Fluoranthene	156	34.3	113	50.7	490	270	7,797	2,500	838	853
	Pyrene	127	27.7	96.6	40.4	363	195	5,127	1,739	594	636
	Benzo(a)anthracene	61.4	14.5	40	18.6	217	99.3	3,345	1,154	358	361
	Benzo(k)fluoranthene	112	31.2	90.9	39.1	369	151	6,257	2,315	723	679
	Benzo(a)pyrene	55.7	17	1.41	15.2	194	64.7	3,691	1,260	417	371
	Indeno(1,2,3-cd)pyrene	65.7	15.4	36.1	14.1	163	67.3	2,275	877	268	281
	Dibenzo(ac/ah)anthracene	11.8	23.8	7.87	3.32	30.3	15.5	546	201	65.2	53.8
	Benzo(ghi)perylene	47.2	12.5	35	13.5	120	55.3	1,499	598	183	216
	Sum of 16 PAHs	773	198	578	266	2,778	1,330	48,973	14,473	5744	4694
	PCB	Sum of PCBs*	0.78	0.79	522	4.29	7.59	3.56	79	15.8	16.0
PBDE	Sum of PBDEs**	0.38	1.49	26.1	4.75	8.80	1.13	14.6	4.99	40.2	22.0

\*The analyzed PCB congeners are: 28, 52, 101, 118, 138, 153, 180

\*\* The analyzed PBDE congeners are: 28, 47, 66, 49+71, 77, 85, 99, 100, 119, 138, 153, 154, 183, 196, 206, 209

Legend:

Basic level	Without toxic effects	Chronic poisoning after prolonged exposure	Acute toxicity after short-term exposure	Severe acute toxicity
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Table 157 shows the published findings (Harman et al 2013) related to organochlorine pesticide content in the sediment of the river Bosna.



ng/g	Substance	ST1	ST2	ST3	ST4	ST5	ST6a	ST6b	ST6c	ST7	ST8
Isomers HCH	a-HCH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
	b-HCH	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.01	<0.01	<0.01	<0.01
	g-HCH (lindane)	0.01	0.02	0.02	0.02	0.03	0.02	0.03	0.02	0.01	0.02
	Total	0.01	0.02	0.02	0.02	0.03	0.02	0.05	0.02	0.01	0.02
DDT – isomers and metabolites	<i>o,p'</i> -DDE	0.02	<0.01	0.04	0.02	0.03	<0.01	0.02	0.01	0.04	0.03
	<i>p,p'</i> -DDE	1.1	0.39	1.5	0.57	1.0	0.31	0.97	0.37	1.8	1.2
	<i>o,p'</i> -DDD	0.17	0.05	0.35	0.13	0.18	0.08	0.29	0.09	0.52	0.25
	<i>p,p'</i> -DDD	0.49	0.17	1.0	0.37	0.56	0.20	0.50	0.29	0.95	0.61
	<i>o,p'</i> -DDT	0.05	0.03	0.09	0.14	0.12	0.05	0.11	0.03	0.11	0.12
	<i>p,p'</i> -DDT	0.15	0.07	1.6	0.48	0.50	0.20	2.1	0.18	0.49	0.51
	Total DDT	1.9	0.71	4.6	1.7	2.4	0.85	4.0	0.97	3.9	2.8
Cyclodienes („drin-s“)	Dieldrin	<0.01	0.16	0.05	0.02	0.03	0.02	0.64	0.02	0.02	0.02
	Aldrin	0.01	0.17	0.01	0.016	0.02	0.02	1.3	0.03	0.02	0.01
	Isodrin	0.01	0.15	0.01	0.01	0.02	0.02	1.4	0.03	0.03	0.01
	Endrin	0.02	0.40	0.06	0.07	0.10	0.15	<b>3.2</b>	0.08	0.08	0.07
	Total	0.04	0.87	0.13	0.13	0.16	0.21	6.7	0.16	0.14	0.11
Other cyclodienes	Heptachlor	0.59	<b>1.5</b>	<b>5.8</b>	<b>4.1</b>	<b>9.0</b>	<b>4.5</b>	0.5	<b>2.2</b>	<b>9.2</b>	<b>6.8</b>
	Heptachlor- exo-epoxide	<0.01	0.27	<0.01	<0.01	<0.01	<0.01	0.15	0.01	<0.01	<0.01
	Heptachlor- endo-epoxy	0.05	0.62	0.05	0.07	0.12	0.10	1.2	0.28	0.11	0.05
	<i>trans</i> - Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.05	<0.01	<0.01	<0.01
	<i>cis</i> -Chlordane	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.13	<0.01	<0.01	<0.01
	Oxychlordane	<0.01	0.02	<0.01	<0.01	<0.01	<0.01	0.33	0.01	0.01	<0.01
	Chlordane	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.09	<0.01	<0.01	<0.01
	Total	0.64	2.5	5.9	4.2	9.1	4.6	3.4	2.5	9.4	6.9

Legend: HCH = hexachlorocyclohexane

Note: Values in bold: concentrations exceeding the TEL (threshold effect level) and PEL (probable effect level)

During the implementation of the project NATO ESP.EAP.SFP 984073 „Development of a Decision Support System for Reducing Risk from Environment Pollution in the Bosna River“ the determination of POPs in sediment and river water of the river Bosna was conducted. Results of the determination of POPs in sediments related to the samples that were collected during 2012 in several different locations watercourse of the river Bosna.

Name of substance	Sampling locations						
	Modriča, upstream	Doboj, downstream	Žepče, upstream	Zenica, upstream	Upstream from influx of river Lašva	Upstream from Sarajevo	Source of river Bosna
Hexachlorobenzene	<1	<1	<1	<1	<1	<1	<1
Octylphenol	<50	<50	<50	<50	<50	<50	<50
4-n-nonylphenol	<50	<50	<50	<50	<50	<50	<50
Dehp	489	435	2,437	1,834	1,020	345	1,090
Nonylphenol	<100	<100	115	106	<100	<100	108
Pentachlorobenzene	<1	<1	<1	<1	<1	<1	<1
4-tert-octylphenol	<50	<50	<50	<50	<50	<50	<50
Fluorene	<10	<10	<10	<10	<10	<10	<10
Phenanthrene	699	479	684	346	152	124	196
Anthracene	335	152	182	119	76	18	45
Fluoranthene	1689	461	701	301	102	168	236
Pyrene	1274	361	709	122	109	156	184
Benzo (a) anthracene	153	<10	<10	<10	<10	16	<10
Chrysene	466	<10	<10	<10	<10	11	<10
Benzo (b) fluoranthene	55	<10	<10	<10	<10	<10	<10
Benzo (k) fluoranthene	25	<10	<10	<10	<10	<10	<10
Benzo (a) pyrene	21	<10	<10	<10	<10	<10	<10
Indeno (123-cd) pyrene	<10	<10	<10	<10	<10	<10	<10
Benzo (ghi) perylene	<10	<10	<10	<10	<10	<10	<10

Table 157:  
Organochlorine pesticide  
content (ng/g) in the  
sediment of the river  
Bosna (Harman C et al,  
2013)

Table 158:  
The content of POPs  
in the sediment of the  
river Bosna determined  
in 2012 through the  
implementation of the  
project NATO ESP.  
EAP.SFP 984073  
„Development of a  
Decision Support System  
for Reducing Risk from  
Environment Pollution in  
the Bosna River“

Name of substance	Sampling locations						
	Modriča, upstream	Doboj, downstream	Žepče, upstream	Zenica, upstream	Upstream from influx of river Lašva	Upstream from Sarajevo	Source of river Bosna
Trifluralin	<1	<1	<1	<1	<1	<1	<1
Aldrin	<5	<5	<5	<5	<5	<5	<5
Isodrin	<5	<5	<5	<5	<5	<5	<5
DDE-4,4'	<2	<2	<2	<2	<2	<2	<2
Dieldrin	<5	<5	<5	<5	<5	<5	<5
Endrin	<5	<5	<5	<5	<5	<5	<5
DDD-4,4'	<2	<2	<2	<2	<2	<2	<2
DDT-2,4'	<2	<2	<2	<2	<2	<2	<2
DDT-4,4'	<2	<2	<2	<2	<2	<2	<2
BDE technical (five congeners)	<200	<200	<200	<200	<200	<200	<200
SCCP.	<500	<500	<500	<500	<500	<500	<500
PCB-28	<1	<1	<1	<1	<1	<1	<1
PCB-52	<1	<1	<1	<1	<1	<1	<1
PCB-101	<1	<1	<1	<1	<1	<1	<1
PCB-118	<1	<1	<1	<1	<1	<1	<1
PCB-153	<1	<1	<1	<1	<1	<1	<1
PCB-138	<1	<1	<1	<1	<1	<1	<1
PCB-180	<1	<1	<1	<1	<1	<1	<1
PCB-194	<1	<1	<1	<1	<1	<1	<1
TBT	<100	<100	<100	<100	<100	<100	<100

All concentrations expressed in mg/kg

On the basis of the presented results, the Environment, Health, Research and Development Group has determined that the most threatened part of the Bosna River is located immediately downstream of Doboj, which can also be explained by the presence of PAHs, released by the industrial facilities in Tuzla. Since this water is not used for drinking, it is not analysed according to the WHO guidelines related to drinking water. This area is threatened in terms of ecological assessment of possible effects on the biota (aquatic organisms) and is evaluated in relation to Environmental quality standards (EQS)<sup>120</sup>. The relationship of the concentrations of individual PAHs in sediments and SPMD, indicates their origin from combustion process, which additionally confirms the previous assumption. Specifically, if the relationship between the concentrations of benzo(a)anthracene, and the sum of the concentrations of benzo(a)anthracene and chrysene (benz(a)anthracene/benz(a)anthracene+chrysene) is greater than 0.35, that indicates the pyrogenic origin PAH. If the relationship between the concentrations of fluorene and the sum of the concentration of fluorene and pyrene (fluorene/fluorene+pyrene) is less than 0.4, that indicates petrogenic origin PAH (Djedjibegovic et al., Journal of Environmental Science and Health Part B (2010) 45, 128–136). Among all the organochlorine pesticides, heptachlor was predominant.

### 2.3.14.1.3 POPs in river water

During 2007, NIVA and the Faculty of Pharmacy of the University of Sarajevo performed tests to determine the presence of POPs in the water of the River Neretva (one of the two largest rivers in BiH) based on the application of membrane systems for passive sampling (SPMD). The test results were published in 2010 (Đedjibegović et al 2010). The following locations were selected for the set-up of the passive sampling system:

- Glavatičevo-Lađanica, because it is assumed to be the site with lowest contamination<sup>121</sup>
- Salakovac<sup>122</sup>
- Gabela, because it is the site nearest to the border of Bosnia and Herzegovina and Croatia, and all the pollutants are emitted downstream from this location into the Neretva River<sup>123</sup>.

<sup>120</sup> EQS are made at state level and have not been adopted in Bosnia and Herzegovina; therefore, Norwegian guidelines were used for the assessment (Harman et al. 2013).

<sup>121</sup> Based on the fact that there are no known sources of contamination and by definition represents a so-called "remote area", meaning away from the urban centers and possible sources of contamination. The site is located near the source of the river, the surrounding area is free of agricultural production, settlements are rare and there are no industrial facilities.

<sup>122</sup> This site is located approximately in the middle of the watercourse of the river Neretva, on the territory of Bosnia and Herzegovina (Neretva is a transboundary river), it is situated upstream of Mostar, which is the largest industrial center situated on the Neretva River and downstream of Konjic, and it represents a control point which shows how the burden of the river originates from the industrial facilities located in Mostar and the consequences of industrial and agricultural activities (part of the Neretva River, which runs through Buturović field, and downstream of Konjic is an area of intense agricultural production, a significant commercial industrial facility, which may have been a source of certain POPs, was located in Konjic).

<sup>123</sup> This site is located on the lower course of the Neretva River, downstream of the industrial centers such as Mostar, downstream of hydropower plants, and in an area with intensive agricultural production.

Table 159 gives an overview of the published findings (Đedićbegović et al 2010) related to organochlorine pesticides in SPMD and the corresponding concentrations that were calculated for the water.

Analyte	Lađanica (L1)		Salakovac (L2)		Gabela (L3)	
	ng SPMD <sup>-1</sup>	pg/l	ng SPMD <sup>-1</sup>	pg/l	ng SPMD <sup>-1</sup>	pg/l
Pentachlorobenzene	<0.50	ND	0.58	ND	0.80	4.4
Hexachlorobenzene	4.9	27	11	40	5.4	29
Heptachlor	3.5	20	<2.0	ND	<3.0	ND
Oxychlorodane	<3.0	ND	<3.0	ND	<3.0	ND
cis-Chlordane	<3.0	ND	<3.0	ND	<3.0	ND
trans-Chlordane	<3.0	ND	<3.0	ND	<3.0	ND
Aldrin	<1.0	ND	<1.0	ND	<1.0	ND
Dieldrin	<2.0	ND	<2.0	ND	7.3	57
α-HCH	<1.0	ND	<1.0	ND	<1.0	ND
γ-HCH	NA	NA	NA	NA	NA	NA
p,p'-DDD	<2.0	ND	<3.0	ND	<2.0	ND
p,p'-DDT	<3.0	ND	<1.0	ND	3.9	ND
p,p'-DDE	<1.0	ND	<1.0	ND	2.4	14
Total OCPs	8.4	47	11	40	22	140

Legend: ND = concentrations lower than the detection limit; NA = concentrations equal to the results of the test run.

Table 160 gives an overview of the published findings (Đedićbegović et al. 2010) related to polycyclic aromatic hydrocarbon content (PAH) in the semipermeable membrane devices (SPMD) and the calculated values of PAH content in water.

Analyte	Lađanica (L1)		Salakovac (L2)		Gabela (L3)	
	ng SPMD <sup>-1</sup>	pg/l	ng SPMD <sup>-1</sup>	pg/l	ng SPMD <sup>-1</sup>	pg/l
Naphthalene	<25	ND	<25	ND	<25	ND
Acenaphthylene	<3.0	ND	<3.0	ND	4.0	63
Acenaphthen	<5.0	ND	7.0	76	47	860
Fluorene	2.3	24	33	270	32	320
Phenanthrene	9.7	89	130	970	130	1,200
Anthracene	<3.0	ND	<3.0	ND	3.7	ND
Fluoranthene	8.7	49	63	240	110	1,200
Pyrene	4.3	ND	3.3	ND	26	140
Benzo(e)pyrene	<3.0	ND	<3.0	ND	5.3	32
Dibenzothiophen	<3.0	ND	7.0	57	8.0	79
Perylene	<3.0	ND	<3.0	ND	<3.0	ND
Benz(a)anthracene	<3.0	ND	<3.0	ND	5.0	28
Chrysene	<3.0	ND	3.7	ND	9.0	48
Benzo(b)fluoranthene	<3.0	ND	<3.0	ND	8.7	48
Benzo(k)fluoranthene	<3.0	ND	<3.0	ND	<3.0	ND
Benzo(a)pyrene	<3.0	ND	<3.0	ND	<3.0	ND
Indeno(1,2,3-cd)pyrene	<3.0	ND	<3.0	ND	<3.0	ND
Dibenz(a,h)anthracene	<3.0	ND	<3.0	ND	<3.0	ND
Benzo(g,h,i)perylene	<3.0	ND	<3.0	ND	<3.0	ND
Total PAHs	21	160	240	1,600	390	4,000

Legend: ND = concentrations lower than the detection limit

*Table 159:*  
Organochlorine pesticide content in the water of the river Neretva, calculated in 2007, based on the values specified in the semi permeable membrane devices (SPMD) (Đedićbegović et al, 2010)

*Table 160:*  
PAH content in SPMD and in the water of the river Neretva (Đedićbegović et al, 2010)

Table 161 gives an overview of the published findings (Đedibegović et al, 2010) related to concentrations of polychlorinated biphenyls (PCBs) and polybrominated diphenyl ether (PBDEs) determined in semipermeable membrane devices (SPMD) and in the water of the river Neretva.

**Table 161:**  
PCB and PBDE  
content in SPMD and  
in the water of the river  
Neretva (Đedibegović et  
al, 2010)

Analyte	Lađanica (L1)		Salakovac (L2)		Gabela (L3)	
	ng SPMD <sup>-1</sup>	pg/l	ng SPMD <sup>-1</sup>	pg/l	ng SPMD <sup>-1</sup>	pg/l
PCB 28	<1.0	ND	<1.0	ND	4.4	24
PCB 52	<1.0	ND	<1.0	ND	2.4	14
PCB 101	<1.0	ND	<1.0	ND	<1.0	ND
PCB 105	<1.0	ND	<1.0	ND	<1.0	ND
PCB 118	<1.0	ND	<1.0	ND	<1.0	ND
PCB 138	<1.0	ND	2.4	13	3.0	25
PCB 153	<1.0	ND	2.5	14	3.7	33
PCB 156	<1.0	ND	<1.0	ND	<1.0	ND
PCB 180	<1.0	ND	<1.0	ND	1.6	19
PCB 209	<1.0	ND	<1.0	ND	<1.0	ND
<b>Total PCB</b>	<b>ND</b>	<b>ND</b>	<b>4.9</b>	<b>27</b>	<b>15</b>	<b>120</b>
PBDE 28	<0.30	ND	<0.30	ND	<0.30	ND
PBDE 47	0.11	0.70	0.27	1.0	1.2	7.3
PBDE 49	<0.30	ND	<0.30	ND	<0.30	ND
PBDE 66	<0.30	ND	<0.30	ND	<0.30	ND
PBDE 71	<0.30	ND	<0.30	ND	<0.30	ND
PBDE 77	<0.30	ND	<0.30	ND	<0.30	ND
PBDE 85	<0.30	ND	<0.30	ND	<0.30	ND
PBDE 99	0.1	0.40	0.18	0.80	0.92	6.8
PBDE 100	<0.50	ND	<0.50	ND	<0.50	ND
PBDE 119	<0.30	ND	<0.30	ND	<0.30	ND
PBDE 138	<0.50	ND	<0.50	ND	<0.50	ND
PBDE 153	<0.40	ND	<0.40	ND	<0.40	ND
PBDE 154	<0.30	ND	<0.30	ND	<0.30	ND
PBDE 183	<0.60	ND	<0.60	ND	<0.60	ND
PBDE 205	<0.30	ND	<0.30	ND	<0.30	ND
<b>Total PBDE</b>	<b>0.21</b>	<b>1.1</b>	<b>0.45</b>	<b>1.8</b>	<b>2.1</b>	<b>14</b>

Legend: ND = concentrations lower than the detection limit

Table 162 shows the values for the content of POPs in the water of the river Bosna, in 2012, recalculated based on the values specified in the semipermeable membrane devices (SPMD) during project execution NATO ESP.EAP.SFP 984073. All concentrations are expressed in picograms per litre (pg /l).

**Table 162:**  
The content of POPs  
in the water of the  
river Bosna in 2012  
recalculated based on  
the values specified  
in the semipermeable  
membrane devices  
(SPMD) during  
implementation of  
project NATO ESP.EAP.  
SFP 984073

Name of substance	Sampling location									
	River Bosna source	Sarajevo, downstream	Visoko, upstream	Visoko, downstream	Upstream of Lašva mouth	Žepče, upstream	Maglaj, upstream	Doboj, upstream	Modriča, upstream	Modriča, downstream
Acenaphthylene	465	4,799	5,279	4,017	2,161	1,542	924	2,014	1,799	1,231
Acenaphthen	133	1,179	1,563	1,277	701	21,043	10,698	20,506	12,732	5,704
Fluorene	<56	5,000	5,543	4,165	2,538	4,642	3,036	6,394	4,591	2,849
Fenanthren	262	15,506	17,355	13,050	8,978	4,206	4,320	11,576	8,713	11,008
Anthracene	89	1,196	980	805	624	667	485	16,69	738	874
Fluoranthene	85	5,731	5,851	4,229	3,150	6,113	5,963	7,835	5,367	8,626
Pyrene	61	5,825	5,549	4,052	3,623	8,293	6,528	5,758	4,039	7,113
Benz [a] anthracene	34	473	497	364	302	534	412	445	298	538
Crisene	56	1,053	1099	777	665	958	879	713	589	1,153

Name of substance	Sampling location									
	River Bosna source	Sarajevo, downstream	Visoko, upstream	Visoko, downstream	Upstream of Lašva mouth	Žepče, upstream	Maglaj, upstream	Doboj, upstream	Modriča, upstream	Modriča, downstream
Benzo [b] fluoranthene	<20	211	213	199	144	207	267	153	153	287
Benzo [k] fluoranthene	<20	149	207	147	101	165	189	115	120	125
Benzo [a] pyrene	<20	95	126	114	85	128	117	73	74	127
Indeno [1,2,3-cd] pyrene	<20	89	114	151	122	89	141	106	98	107
Dibenz [a, h] anthracene	<20	<21	<25	<28	<21	<17	<28	<19	<29	<30
Benzo [ghi] perylene	48	117	149	153	127	101	133	98	94	127
PCB 28	1.2	64.6	58.8	72.6	51.9	31.7	41.3	31.1	21.8	34.2
PCB 52	1.0	24.3	43.1	46.2	34.1	17.0	25.5	29.2	16.1	30.7
PCB 101	1.7	10.7	30.6	23.6	17.6	9.7	9.8	12.0	9.8	19.4
PCB 118	2.6	6.0	19.4	15.1	9.6	3.8	3.9	7.8	4.0	8.3
PCB 153	5.8	12.9	19.3	17.6	11.4	4.1	7.7	16.9	11.3	13.6
PCB 138	6.5	10.4	5.7	5.1	10.9	4.0	6.8	9.2	8.5	5.4
PCB 180	7.1	6.9	8.1	2.5	2.7	3.0	3.3	4.1	8.1	3.4
Pentachlorobenzene	<0.5	1.6	<0.6	3.3	1.9	1.3	2.2	2.0	2.3	1.7
Hexachlorobenzene	1.8	10.6	4.9	20.3	10.0	3.6	7.3	6.3	4.0	5.2
alpha-HCH	5.9	4.2	<3.0	21.5	8.9	11.3	9.6	10.7	6.6	6.6
beta-HCH	<2.3	6.8	2.3	90.7	52.9	52.3	11.9	20.3	9.7	17.5
Lindane	<2.3	7.2	5.0	15.1	9.5	5.4	8.7	6.8	6.9	4.2
delta-HCH	<1.2	<1.2	<1.2	<1.3	<1.2	<1.1	<1.3	<1.1	<1.3	<1.3
o,p'-DDE	<0.5	0.8	0.8	1.0	0.6	<0.4	<0.6	<0.5	<0.7	<0.7
p,p'-DDE	1.8	16.8	14.6	15.6	9.6	5.2	6.2	5.2	5.9	11.3
o,p'-DDD	<0.5	5.2	5.8	5.2	4.5	1.4	1.8	2.1	2.0	4.4
p,p'-DDD	<0.5	15.3	15.8	12.7	10.0	2.5	4.3	3.8	5.7	11.0
o,p'-DDT	0.8	2.7	2.4	4.1	3.0	0.9	1.2	1.2	1.8	1.6
p,p'-DDT	1.3	3.2	0.9	2.6	3.8	2.4	2.0	2.1	3.0	2.3
Endosulfan (alpha+beta)	<20.0	<20.7	<23.2	<25.5	<20.8	<18.0	<25.7	<19.4	<26.4	<27.2

By comparing the results of the Project APOPSBAL and the results of the research conducted by NIVA and the Faculty of Pharmacy of the University of Sarajevo, the Environment, Health, Research and Development Group has concluded that the results obtained in the framework of the latter research (NIVA and the Faculty of Pharmacy) are significantly lower than those stated in the report of the Project APOPSBAL, and they are related to the rivers that belong to the Black Sea basin, as well as the River Bosna. The sum of the concentrations of PCB congeners, which is known as the "7 dutch", in the sediments of rivers that were examined during the project APOPSBAL, varies from 60 ng/g to 2,691 ng/g simultaneously, the highest measured concentration in sediment from the river Bosna is 522 ng/g. If we were to disregard this extreme value, the average concentration of PCBs "7 dutch" in 9 sediments from different locations of the River Bosna would be 15.34 ng/g, which is almost four times lower than the lowest concentration that was determined during the realization of Project APOPSBAL.

With the help of all these results, the Environment, Health, Research and Development Group has determined that the most threatened part of the Bosna River, with the highest concentrations of pollutants among those that were tested, is located immediately downstream of Doboj, which can also be explained by the presence of PAHs released by the industrial facilities in Tuzla. A coking plant and thermal power plants, whose primary operating system is based on coal combustion, are located in Tuzla. In Tuzla, there is no petrochemical industry. The relationship of the concentrations of individual PAHs in sediments and SPMD indicates their origin from combustion process, which additionally confirms the previous assumption. Among all the organochlorine pesticides, heptachlor was predominant in many locations (Table 157 - ST2, St3, St4, St5, St6a, St6c, St7 and St8).

#### 2.3.14.1.4 POPs in soil

According to publicly available information (RECETOX 2013) acquired by the Environment, Health, Research and Development Group, Project APOPSBAL's main objective was to

monitor the concentrations of polychlorinated biphenyls (PCBs), polybrominated diphenyl ether (PBDEs) in flame retardants and explosives, which were released into the environment during the war in the former Yugoslavia. Within the project, on the territory of Bosnia and Herzegovina, the Research Centre for Toxic Compounds in the Environment (RECETOX), an institute at the Faculty of Science at Masaryk University in the Czech Republic, conducted tests in the period 2002 – 2005, by sampling PCB content in soil, sediments and air. There is no information on the aforementioned flame retardants which include PBDEs in the published results of the Project APOPSBAL, acquired by the Environment, Health, Research and Development Group. According to available data on this project, the concentration of PCBs in soil, detected in BiH, originates from military installations, broadcasting relay stations, transformers and transformer stations that were destroyed during the war, in the period 1992-1995.

During the development of the inventory, the Environment, Health, Research and Development Group was unable to obtain detailed information about the location or date of the sampling.

The project results of determining PCB content in soil were significantly variable and ranged from 50 ng/g to over 100 million ng/g dry weight of sample. In most cases, the PCB content was below 10,000 ng/g dry weight of sample, but in some areas in Tuzla there were concentrations of 96,178,000 ng/g dry weight and in Tešanj 178 954 000 ng/g dry weight. Table 163 shows the results of Project APOPSBAL in the period 2002-2005, related to the concentration of PCBs in soil.

*Table 163:  
PCB content (ng/g)  
in soil based on the  
results of the Project  
APOPSBAL in the period  
2002-2005*

Region	Location	Concentration PCB in ng/g
Banja Luka	Certain areas in the city (not stated which areas)	400,000
Sarajevo	Military facilities in Jahorina	6,000
	Bjelašnica- military power plants	1,820
	Trebević, tunnel in Debelo Brdo	2,200-2,400
Jelah*	Transformer station (west side of the transformer station, near the damaged condensers)	> 20,000
		> 100,000
Bihać**	Željava Barracks - Tunnel	106,000 – 164,000
	The spring Klokot, sediment	< 10

**Footnote:**

\* The project results state that spilled oil with PCBs can reach the river Usora and from there the wells for water supply, used by residents living on the left bank of Usora, and it is also possible that it can reach the wells that supply the city Tešanj with water. However, further studies to confirm these allegations were not made.

\*\* The concentration of PCBs during the 2004 was lower than in 2003. The territory, in which these quantities of PCB were found, is a karst area; therefore, there is a possibility of penetration of PCBs into local creeks, and thence into the river Una. However, further studies to confirm these allegations were not made.

### 2.3.14.2 The impact of POPs on human health

During the development of the inventory, the Environment, Health, Research and Development Group was unable to find any information on systematic studies about the effects of POPs on human health in BiH, or data on the assessment of public health risks associated with the presence of these substances in the environment and food. Furthermore, the Environment, Health, Research and Development Group has not found any studies that researched the social and economic implications of the presence of POPs in food, water and the environment.

With regard to the administrative organization of BiH, the Public Health Institute of FBiH, Public Health Institute of RS and the Government of BD are responsible for health care and regularly publish bulletins on the health status of the population. The most recently published bulletin for the territory of the Federation of Bosnia and Herzegovina is "Health and Health Care Status of population in the Federation of Bosnia and Herzegovina in 2011" published by the Public Health Institute of FBiH in 2012. According to this report:

- The rate of death due to malignant diseases is somewhat lower than in the EU countries and the countries in the region (155.9 F BiH; 165.15 in the regional countries and 196 in EU countries);
- Malignant neoplasms are the second most common cause of death (after cardiovascular diseases) at around 20.9%; and the share of malignant neoplasms in overall mortality is slightly higher than the previous year, 2010;

- Third on the list are the endocrine and metabolic disorders, with a share of 6.1% in overall mortality. It is interesting that malignant neoplasms do not fall within the five leading causes of death among women, whereas in case of men, malignant neoplasms of bronchus and lung are third on the list, with an increase of 8.1% in frequency, compared to 2010.
- The number of newly diagnosed malignant diseases is in slight decline compared to 2010, but again with a higher number among men than women. As for the number of newly registered malignancies per canton, the Sarajevo Canton has by far the highest rate, followed by Posavski and Bosansko-podrinjski Cantons.

Even though the Environment, Health, Research and Development Group was not able to find the official documents of the institutions responsible for monitoring the health of people in Bosnia and Herzegovina, in relation to the possible and/or probable impact of POPs on human health, on the basis of international publications (World Health Organisation – International Agency for Research on Cancer: Agents Classified by the IARC Monographs) the primary consequences of long-term exposure to POPs are precisely genotoxic carcinogens, followed by the formation of malignant neoplasms and the impact on the endocrine system. Considering the slight increase of these diseases' share in the overall mortality rate, the Environment, Health, Research and Development Group believes that a risk assessment of the effects of POPs and regular monitoring of populations exposed to these substances are imperative.

Air pollution parameters are monitored by the Federal Hydro-meteorological Institute, but the 4 stations owned by the Institute are not adequate for the collection of air quality data that will allow analysis of the effects of POPs on human health and the environment in the territory of the Federation of Bosnia and Herzegovina. The continuous measurements of basic air pollutants (SO<sub>2</sub>, soot and nitrogen oxides) are also performed by the cantonal public health institutes in Sarajevo, Tuzla and Zenica, whereas in other cities no measurements are made due to lack of proper equipment.

In the bulletin "Health and Health Care Status of population in the Federation of Bosnia and Herzegovina in 2011", in the section 4. 3. 2. *Air*, it is stated that indicators of air pollution are SO<sub>2</sub>, NO<sub>2</sub>, soot and nitrogen oxides. It also conveys that the most significant pollutants, in terms of concentrations of air, are thermal power plants, industrial plants, motor vehicles and individual heating units (in winter). After consulting with the institutions listed in Appendix 9, the Environment, Health, Research and Development Group has determined that, in this part of the report, the substances from the list of the Stockholm Convention were not mentioned, even informatively, which indicates that the existence and concentration of these substances in the air are not measured.

In the section 4.3.3. *Waste materials* of the bulletin, it is stated that in the Federation of BiH, the disposal of solid and liquid waste materials represents one of the major problems of environmental management which may have direct effects on the protection of human health. Annually, Bosnia and Herzegovina produces approximately 270 kg of waste per capita. When it comes to solid waste, the biggest problem is its uncontrolled disposal and the creation of "wild" landfills (in 1893 locations in Bosnia and Herzegovina). Most municipal landfills do not meet the standards of acceptable waste disposal, which can cause the outbreak and spread of infectious diseases. The landfills in Sarajevo, Mostar, Zenica and Bosanska Krupa partially meet the European requirements for sanitary landfills, because they have multi-barrier systems; however, the wastewater is not purified in the wastewater treatment plant, but only recirculated.

Hazardous waste (industrial, medical) in most cases is disposed of together with domestic waste. In the Federation of BiH there is an insufficient number of activities related to the introduction of an appropriate waste management system, which implies establishing control over the storage and disposal of medical waste, waste oil, waste contaminated with PCBs and asbestos, which can be present in construction waste.

The section 4.3.4. *Food and consumer goods safety* of the bulletin, specifically refers to the laboratory equipment owned by the Public Health Institute of FBiH for food safety analysis, however the Environment, Health, Research and Development Group found no data on whether measurements were made to determine the concentration of organochlorine pesticides in samples of food and consumer goods<sup>124</sup>, and whether these data were

<sup>124</sup> Consumer goods include dishes, utensils, installations, appliances and packaging for food, toys, personal hygiene products, skin and bodycare products and their packaging, cleaning products, tobacco, tobacco products and smoking accessories, certain items which, while using, come into direct contact with the skin or the mucous membranes

published. The bulletin refers exclusively to controlling the microbiological safety of food, in order to prevent foodborne toxicoinfections<sup>125</sup> that are in the top ten infectious diseases in the Federation of BiH.

The Environment, Health, Research and Development Group also analysed the information presented in the bulletin "Population Health Status for the year 2010" issued by the Public Health Institute of Republika Srpska in 2011. According to bulletin data, malignant neoplasms are the second leading cause of death (after cardiovascular and cerebrovascular diseases) with a total share of 20.52%, which is approximately similar to the situation in the Federation of BiH, but indicates an increase compared to the previous year in Republika Srpska.

In the bulletin (*Chapter 8: Living Environment*) it is stated that during the year 2011, 8,584 water samples from 56 central water supply systems in the municipalities of Republika Srpska, were analysed and 238 samples were irregular. Irregularity is mainly related to high turbidity and colour, high level of oxidizability, nitrite and ammonia content, low level of residual chlorine and similar.

The substances listed in the Annexes to the Stockholm Convention are not mentioned in this bulletin. As for food control, the bulletin states that, in 2011, a total of 13 009 samples were examined, and 4.22% of them did not meet the criteria for physical and chemical safety. The cause of this irregularity is not conveyed and there are no test data on POPs in food. The report provides no information on the quality control of surface water, soil and waste.

### 2.3.14.3 Identification of population or environments negatively impacted by POPs, estimated scale and magnitude of threat to public health and environmental quality

While developing the inventory, the Environment, Health, Research and Development Group analysed the available written data and the studies available to a wider scientific audience of relevant professional journals, using science-specific search engines, which are focused on scientific information, such as Scirus, Google Scholar and similar. The analysed studies<sup>126</sup> indicate possible genotoxic and carcinogenic effects of POPs substances, but due to lack of cohort studies<sup>127</sup>, the Environment, Health, Research and Development Group was not able to identify the segments of the population in Bosnia and Herzegovina that are particularly at risk.

Based on empirical findings<sup>128</sup>, the Environment, Health, Research and Development Group has concluded that the people at high-risk are the ones who are professionally exposed to POPs, which can enter the human body through the lungs (inhalation), through the skin (dermal) or by mouth (ingestion). They include:

- persons working on hazardous waste landfills
- fire-fighters, particularly those who are involved in extinguishing fires on electrical installations
- persons working on repairs and replacement of condensers and transformers
- workers in the construction industry who are involved in removing old paint, plaster and floor coverings
- persons who work in the production and processing of painted metals, building materials and the impregnation of different materials for fire protection
- persons employed in the chemical and textile industry.

Based on the analysis of scientific literature available to the general scientific community, the Environment, Health, Research and Development Group has determined that people, who are not occupationally exposed to POPs, come into contact with large quantities of POPs through food, therefore fish, milk and dairy products, and to a minor extent, fruits

<sup>125</sup> Food poisoning

<sup>126</sup> WHO IARC: IARC Monographs on the evaluation of carcinogenic risk of the chemical to man – Certain polycyclic aromatic hydrocarbons and heterocyclic compounds, volume 3. IARC Lyon 1973; WHO IARC: IARC Monographs on the evaluation of carcinogenic risk of the chemical to man – Some organochlorine pesticides, volume 5. IARC Lyon 1975; WHO IARC: IARC Monographs on the evaluation of carcinogenic risk of the chemical to man – Polynuclear aromatic compounds, part1, chemical, environmental and experimental data, volume 32. IARC Lyon 1983; WHO IARC: IARC Monographs on the evaluation of carcinogenic risk of the chemical to man – Some halogenated hydrocarbons and pesticide exposure, volume 41. IARC Lyon 1986.

<sup>127</sup> This is a longitudinal study that begins with gathering patient groups (cohorts) of certain characteristics. One group of patients is exposed to interest of the study, while the other is not. Both groups are monitored over a period of time (prospectively) and the outcome is monitored.

<sup>128</sup> Betrazzi P. A., Riboldi L. et al. Cancer mortality of capacitor manufacturing workers. *Am. J. Ind. Med.*, 1987; 11: 165-176; ATSDR Public health statement for polychlorinated biphenyls; ATSDR Public Health Statement for Polybrominated Diphenyl Ethers (PBDEs); ATSDR Public Health Statement for Polycyclic Aromatic Hydrocarbons (PAHs); ATSDR Public Health Statement for Chlorinated Dibenzo-p-dioxins (CDDs).



and vegetable s and water are the main sources of POPs, due to the mechanisms of the penetration of these substances into plants and animals and their lipophilicity, and their retention in the adipose tissue and organs that are rich in lipids and lipid components of plant cuticles<sup>129</sup>. However, due to lack of data, it could not be concluded that this statement pertains to BiH.

Contamination by inhalation is also important, although the composition of some congeners, that are found in the air, are substantially different from the composition of congeners in soil, and commercial products, due to different volatility of some congeners causing various models of toxic effects. Persons who may be particularly exposed are: sport fishermen, especially the ones fishing in contaminated areas and people who consume such fish, people living near landfill sites, and those living in residential buildings made of materials which may contain traces of POPs.

The most vulnerable group consists of persons exposed to POPs substances before birth or shortly after birth and infants, due to the immunotoxic effects of POPs, and due to their impact on the development of the nervous and endocrine systems. Compared to adults, children take larger amounts of food and water in relation to body mass, and therefore are more vulnerable to the influences of POPs. The ingestion of POPs through breast milk is also noteworthy, and more common among the threatened population groups which were previously mentioned. Infants and young children spend most of their time on the floor and have a greater chance of ingesting contaminated material because of their dirty hands, and therefore they are additionally exposed to POPs compounds<sup>130</sup>. However, as mentioned earlier, the lack of any relevant data in BiH does not support the claims made by these international research.

The second most vulnerable group consists of women who, due to physiological reasons, are particularly affected by the endocrine disruptive POPs substances, which lead to developmental disorders, prior to puberty and thereafter. A wide range of malignancies is associated with substances that have estrogenic activity, which renders women particularly vulnerable<sup>131</sup>. However, as mentioned earlier, the lack of any relevant data in BiH does not support the claims made by these international research.

### 2.3.14.4 Conclusions

During the development of the inventory, the Environment, Health, Research and Development Group has not found any information on systematic studies about the effects of POPs on

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- 129 Gasull M., de Basea M. B., Puigdomènech E., Pumarega J., Porta M. Empirical analysis of the influence of diet on human concentrations of persistent organic pollutants: A systematic review of all studies conducted in Spain. *Environmental International*, 2011; 37: 1226-1235; EC (European Commission) 2002. Polycyclic Aromatic Hydrocarbons-Occurrence in foods, dietary exposure and health effects. Scientific Committee on Food, SCF/CS/CNTM/PAH/29 ADDI Final (4 December 2002); Cantor K. P., Blair A., Everett G., Gibson R., Burmeister L. F. Pesticides and other agricultural risk factors for non-Hodgkin's lymphoma among men in Iowa and Minnesota. *Cancer Res*, 1992; 52:2447-55.; Agency for Toxic Substances and Disease Registry (ATSDR) Public Health Statement for Hexachlorobenzene (September 2002); Zhou P. et al. Dietary exposure to persistent organochlorine pesticides in 2007 Chinese total diet study. *Environment International*, 2012; 42: 152-159.; Gunderson E. L. FDA total diet study, July 1986-April 1991: Dietary intakes of pesticides, selected elements, and other chemicals. *J Assoc Off Anal Chem*, 1995; 78:1353-1363.; EFSA reports
- 130 Longnecker M. P., Klebanoff M. A., Zhou H., Brock J. W. Association between maternal serum concentration of the DDT metabolite DDE and preterm and small-for-gestational-age babies at birth. *The Lancet*, 2001; 358:110-114.  
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 Jurewicz J., Hanke W. Prenatal and Childhood Exposure to Pesticides and Neurobehavioral development: Review of Epidemiological Studies. *Int J Occup Med Environ Health*, 2008; 21(2):121-132.  
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- 131 Cohn B., Wolff M., Cirillo P., Sholtz R. DDT and Breast Cancer in Young Women: New Data on the Significance of Age at Exposure. *Environmental Health Perspectives*, 2007; 115 (10):1410-1414.  
 Bonefeld-Jørgensen E. C., Andersen H. R., Rasmussen T. H., Vinggaard A. M. Effect of highly bio accumulated polychlorinated biphenyl congeners on estrogen and androgen receptor activity. *Toxicology*, 2001; 158: 141-153.  
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human health and the environment or published results that relate to the systematic monitoring of these compounds in soil and sediment, air, water, waste, biome and food.

Over the past twenty years in BiH, four scientific research projects funded by foreign institutions have been implemented, and information on the presence of POPs that are not routinely tested have been collected as part of the institutional monitoring during the implementation of these projects. In addition, information on average contamination with certain POPs substances has been obtained.

On the basis of the analysis of the only two projects within the framework of which examinations of POPs content in river sediments in BiH were carried out (Project APOPSBAL and Project "Persistent Pollutants in Rivers in Bosnia and Herzegovina"), the Environment, Health, Research and Development Group has concluded that the most threatened part of the Bosna River is located immediately downstream of Dobož, which can also be explained by the presence of PAHs released by the industrial facilities in Tuzla.

By analysing the collected data that was referred to in this report, the Environment, Health, Research and Development Group has determined that it is not possible to perform risk assessment of the effects of POPs on people and the environment, because there are no basic prerequisites, baseline data, exposure assessment and established mechanisms for continuous monitoring of the effects of POPs.

In this regard, the Environment, Health, Research and Development Group considers that:

- it is not possible to carry out a risk assessment of the effects of POPs and regular monitoring of population exposure to these substances due to the fact that the measuring of concentrations of POPs in the environment is not systematically performed in BiH;
- it is necessary to ensure financing for the elementary education of employees in public health institutes and creating awareness about public-health issues of POPs, because according to their job description, they are responsible for monitoring and measuring the concentrations of POPs in the environment.

### 2.3.15 DETAILS OF ALL RELEVANT SYSTEMS FOR THE ASSESSMENT AND INVENTORY OF NEW CHEMICALS

#### Bosnia and Herzegovina

The management of phytopharmaceutical products and the monitoring of the sale, import, usage and disposal of these products is the responsibility of the Plant Health Protection Administration of Bosnia and Herzegovina, through the Department for Phytopharmaceutical Products and Fertilisers.

Phytopharmaceutical products (PPP) are not allowed to be placed on the market or used on the territory of BiH, if they are not registered, i.e. if a permit has not been issued for the PPP in accordance with the *Law on Phytopharmaceutical Products of BiH* (Official Gazette of B&H, no. 49/04). Pursuant to Article 13 of the Law, it is necessary to submit a request to the Plant Health Protection Administration of Bosnia and Herzegovina to register PPP and to attach along with it the required documentation for the assessment of active substances in PPP. The active substances and PPP are assessed by trained professionals or legal entities who are authorised to do this by the Council of Ministers at the proposal of the Plant Health Protection Administration of Bosnia and Herzegovina, and they are recommended to the Administration by authorities of the entities and Brčko District (authorities for health and environment). Permission to place PPP on the market is issued for a period of ten years at the most, and the registration can be renewed multiple times.

Based on the issued decision on the registration of PPP, the Plant Health Protection Administration of Bosnia and Herzegovina keeps a Unique Register of PPP for BiH. The list of registered PPP is published by the Administration once per year in the "Official Gazette of BiH", and amendments to the list are published at least twice a year. The authorities of the entities and Brčko District are obliged to keep records on registered PPP based on the decision brought by the Administration. The list of active substances which are allowed to be used in PPP on the territory of B&H is published by the Administration in the "Official Gazette of B&H", and the amendments to it are published in accordance with EU standards. The last issued list was published in the Official Gazette of BiH 20/13 and there was not one substance on the list that was listed in the annexes of the Stockholm Convention.

## Republika Srpska

In Republika Srpska, the management of chemicals is under the jurisdiction of the Ministry of Health and Social Welfare of Republika Srpska.

The *Law on Chemicals* (Official Gazette of RS, no. 25/09)<sup>132</sup> stipulates that hazardous chemicals can be produced, used and placed on the market on RS territory only if the appropriate permission has been obtained from the Ministry of Health and Social Welfare of RS. Based on this Law, the list of substances classified in accordance with the classification of substances of the same chemical composition listed in the EU List of classified substances are regularly published in the Official Gazette of Republika Srpska. The Law also regulates the way in which hazardous chemicals are packed and stored. Article 30 of this Law stipulates the existence of an Integrated Inventory of Chemicals which are on the RS market and it consists of an Inventory of Chemicals, Inventory of Biocides and Inventory of Plant Protection Products, and the inventory is kept by the Ministry of Health and Social Welfare of RS.

The Minister of Health and Social Welfare of RS determines the list of substances which are a cause of concern, and for which authorisation is required in the EU. The list of substances which are a cause of concern is published in the Official Gazette of Republika Srpska. The end user of the substance which is on the List of substances which are a cause of concern, i.e. the product which contains that substance, is obliged to deliver a record with relevant data on the usage of that substance, to the Ministry of Health and Social Welfare of RS, if that manner of usage was not registered by the producer or importer into the Inventory of Chemicals. The producer or importer of a chemical which is on the List of substances which are a cause of concern is also obliged to submit details about possible alternative substances and technologies, the risks that they bear and the hazards for human health and the environment, and technical and economic data about substituting that substance with a less hazardous one.

Pursuant to Article 46 of the Law, restrictions and prohibitions are issued on the production, placing on the market and usage of chemicals which present an unacceptable risk for human health or the environment. These restrictions are taken from EU regulations, and in individual cases the minister of health and social welfare can also restrict or prohibit the production, usage or placing on the market of a certain chemical or product which contains a substance which presents an unacceptable risk for human health or the environment.

The circulation of chemicals and products which are registered in the Inventory of Chemicals is free. With the goal of implementing the Rotterdam Convention, a Prior Informed Consent Procedure is implemented (PIC procedure). For chemicals which are not on the list of the Rotterdam Convention, and which are on the list for the PIC procedure, the Ministry of Health and Social Welfare, at the request of the exporter, seeks the consent of authorities of the importing country for the chemical or product.

A legal entity which performs activities related to the production, wholesale distribution and usage of a hazardous chemical, is obliged to register that activity in the Court Register.

Pursuant to the *Law on Biocides* (Official Gazette of RS, no. 37/09), biocide can be placed on the market and used for specified purposes if the minister of Health and Social Welfare of RS has issued a permit for the placement of that biocide on the market, and if the biocide is classified, packed and labelled in accordance with this Law. Pursuant to Article 21 of the Law, the minister of Health and Social Welfare of RS determines the Inventory of Biocides for which a permit has been issued for placement on the market and their usage. This Inventory is part of the Integrated Inventory of Chemicals and it is available through the electronic database which is kept by the Ministry of Health and Social Welfare of RS. The classification, packaging, labelling, advertising, and the content of the material safety data sheet and delivering that sheet for biocide is performed in accordance with regulations for that type of chemical.

Plant protection products, in accordance with the *Law on Plant Protection Products* (Official Gazette of RS, no. 52/10) can be produced, marketed and used in the territory of the Republika Srpska if they are registered and provided with a declaration and instructions for application in accordance with this Law and regulations based on it (as well as those that have been registered in accordance with the relevant regulations of the Federation of BiH), and the active substance or basic substance that these products contain can be produced and marketed,

<sup>132</sup> The law is harmonised with Regulation 1907/2006 of the European parliament and Council from December 18, 2006 on the registration, evaluation, authorisation and restriction of chemicals – REACH and Regulation 1272/2008 of the European parliament and the Council of the European Union from December, 16 2008 on the classification, labelling and packaging of substances and mixtures – CLP.

if included in the List of approved substances. Plant protection products are registered by the Ministry of Agriculture, Forestry and Water Management based on the proposal of the Commission for Plant Protection Products, and on request of the manufacturer or authorized representative.

### Federation of BiH

In the Federation of BiH there is still no official law in force which would treat the management of chemicals, so the *Law on Sale of Poisons* (Official Gazette of RBiH, no. 2/92 and 13/94) is used as a blanket rule. Pursuant to this Law, the authority for poisons is the Federal Ministry of Health. This law does not use the term „chemical“, but rather „poison“<sup>133</sup> with a more narrow meaning than is the case with modern laws on chemicals.

Pursuant to Article 3 of this Law, poisons cannot be placed on the market nor used until they are classified based on their degree of toxicity. The authorised minister makes a decision about classifying poisons into groups, based on the opinion of the Committee for Poisons. This committee is appointed by the authorised minister (in this case the Federal Minister of Health).

According to the mentioned law, labour organisations which deal with the sale of poisons from Group I and Group II have to keep track of the sale of those poisons and the buyers of those poisons. A record of the sale of poisons must contain the following information: the name of the poison, the amount of poison sold, the name of the organisation that provided the poison and the date of obtaining the poison. A record of the buyers of poisons must contain the following information: the name of the organisation, i.e. the full name, address and personal ID number of the person to whom poison is being sold, the names and amount of poison sold, the purpose for which the poison will be used and the signature of the person who received the poison, and for buyers of poisons from Group I – the number of the authorisation, certificate or license and the name of the authority who issued them.

The Council of Ministers of Bosnia and Herzegovina made a Resolution on the adoption of the report on implementing the Rotterdam Convention on its twelfth session which was held on 04 July 2012. A part of that report was a recommendation to the governments of FBiH and Brčko District to start up the activities on harmonising the regulations on chemicals with relevant EU legislature in this field.

In order to harmonise the legal regulations which relate to the management of chemicals in the Federation of BiH, the Federal Ministry of Health prepared a Draft Law on Chemicals and a Draft Law on Biocides in FBiH. The Parliamentary Assembly of FBiH adopted these drafts on its session on 28 June 2013. After that, there was a public debate on these draft laws which was closed on 30 September 2013, therefore we can soon expect the adoption of these two laws. Besides some minor lexical differences, these draft laws are identical to already existing laws which were passed in Republika Srpska in 2009. The adoption of these laws in the Federation of BiH, and the adoption of identical laws in Brčko District will significantly ease and harmonise the procedure of managing chemicals and biocides in both entities and in Brčko District and thereby contribute to the effective application of modern regulations which also relate to POPs.

### Brčko District

Based on the available data, the drafts of the relevant legal procedures which relate to chemicals and biocides have still not been published in Brčko District.

## 2.3.16 DETAILS OF ALL RELEVANT SYSTEMS FOR THE ASSESSMENT AND REGULATION OF CHEMICALS WHICH ARE ALREADY ON THE MARKET

In the previous chapter, a description of ways of monitoring the chemicals which enter the market in BiH was given, but that equally relates to chemicals which are already on the market.

The sale of phytopharmaceutical products is controlled by the Plant Health Protection Administration of BiH, the classification and labelling of products is conducted based on procedures which are harmonised with internationally accepted regulations (see Chapter

<sup>133</sup> Poisons, in the context of this Law, mean substances of natural or synthetic origin and the products made from those substances which, if ingested or if they come into contact with the organism, can endanger lives and people's health or can be harmful for the environment.

2.3.15), and records of approved phytopharmaceutical products, as well as a register of users are kept. Based on the and the *Law on Phytopharmaceutical Agents of BiH* and on the proposal of the Plant Health Protection Administration of BiH, the Council of Ministers of BiH adopts the List of Active Substances permitted for use in phytopharmaceutical agents which are approved in accordance with applicable EU regulations.

Regardless of the fact that in the Federation of BiH the Law on sale of poisons is formally still in force, substances which were prohibited in the country of origin cannot be found on the market, records are kept on substances which based on LD50 belong to Group of Toxicity I and II; a relevant opinion must be sought on classification into groups of toxicity in order for a substance or product which contains it to be found on the market and the sale of certain pesticides which fall into the category of POPs is explicitly prohibited.

In RS, based on the *Law on Plant Protection Products* (Official Gazette of RS, no. 52/10), transport of plant protection products can be made by the companies and entrepreneurs who are registered in the Register of Distributors and Importers of Plant Protection Products kept by the Ministry of Agriculture, Forestry and Water Management of RS. Also, under this Law, the Ministry of Agriculture, Forestry and Water Management of RS keeps the List of Registered Plant Protection Products which is prepared on the basis of the certificates of registration and which is annually published in the "Official Gazette of Republika Srpska".

The laws on chemicals and biocides in Republika Srpska represent modern normative acts which are completely harmonised with the legal legacies of the EU in this field and they ensure a good basis for the management of chemicals and biocides. Adopting these two draft laws of identical content in the Federation of BiH will represent an added guarantee of effective management and monitoring of chemicals which are on the market in BiH.

### 2.3.17 SOCIO-ECONOMIC ANALYSIS

The purpose of this socio-economic analysis is to provide a systematic review of all potential effects which economic and other fields, and management of POPs, have on all sectors of society (including local communities and groups, the civil and private sector, and authorities in BiH). The social effects include changes between individuals and communities where people live, work, spend time, and organise their space and time in order to satisfy their needs and where they generally make effort to be full-fledged members of society (UNEP, 2012.)<sup>134</sup>.

In that context, social and economic effects can include the following aspects:

- vulnerability which is related to direct and indirect exposure to POPs,
- changes in a person's health,
- changes in living costs,
- changes in employment, income and safety at work,
- changes in the distribution of wealth,
- opportunity for entrepreneurial development and changes in seeking public services, such as health, education and infrastructure.<sup>135</sup>

The focus of the analysis is to assess the social effects of the following groups of POPs in B&H:

- Polychlorinated biphenyls (PCB),
- Polybrominated diphenyl ethers (PBDEs) and perfluorooctanesulfonics (PFOS);
- Unintentionally produced POPs - polychlorinated dibenzodioxins and dibenzofurans (PCDD/PCDF).

This analysis was conducted based on the data from the preliminary inventory which was created by five working groups<sup>136</sup>, formed within this project, and based on an overview of relevant international studies on the socio-economic effects and the effects of POPs on people's health (Annex 11), considering that these types of analyses have not been conducted in BiH so far. The identification of the part of the population in BiH which is under the risk of the effects of POPs is presented in Chapter 2.3.14.

<sup>134</sup> UNEP (2012).Guidance for Developing a National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants

<sup>135</sup> Ibid

<sup>136</sup> POPs Pesticides Inventory Group, PCB Inventory Group, PBDEs/PFOS Inventory Group, PCDD/PCDF Inventory Group, the Environment, Health, Research and Development Group

### 2.3.17.1 Polychlorinated biphenyls (PCB)

Despite the fact that the production of PCB did not exist in BiH, the preliminary inventory showed that equipment which contains PCB is still in use, and mostly in closed systems (transformers, capacitors and switches) and barrels which are used for the storage of used oil.

Even though so far studies have not been conducted in BiH in order to analyse the effects of PCB on the environment and people's health, Annex 11 provides a detailed description of potential exposure to PCB and the effects on people's health, based on data from specialised literature and studies which have been conducted throughout the world. Some of the potential damage related to long-term exposure to small doses of PCB:

- Liver and kidney damage;
- Effect on thyroid hormones and potential impact on brain development;
- Effects on the reproductive system, especially on unborn children;
- Possible carcinogenic effects.

Based on internationally accepted research, in Chapter 2.3.14 risk groups which consist of people who are professionally exposed to the effects of POPs were identified, and these primarily include people who work on the repairs of capacitors and transformers, and construction workers who remove old paint, plaster and floor coverings, given that they can contain PCB. People who are not professionally exposed to PCB ingest the most amounts through food (primarily fish, milk and dairy products), and people who live near landfills can also be exposed, and also people who live in inadequate housing which is built from material that may contain traces of PCB.

Environmental impacts of inadequate management of PCB include:

- Environmental pollution (primarily of soil, surface and subterranean waters) due to inadequate storage and disposal of liquids and/or equipment containing PCB, accidents, and leakage from electrical and industrial subjects;
- Redistribution of previously released PCB – the cycle of redistribution includes the evaporation of PCB from water into the atmosphere, transport through the air at great distances and the removal from the atmosphere through the process of wet/dry deposition of PCB, and re-evaporation<sup>137</sup>.

The most significant socio-economic effects related to the usage of equipment and/or liquids which contain PCB include:

- Negative impacts on human health, especially the population which lives near power plants, industrial plants, workshops for transformer and capacitor maintenance, and near areas contaminated by PCB;
- Reduced quality and standard of living;
- Increased expenditure of the health system for treating workers and/or people who are ill from the consequences of exposure to PCB;
- Increased expenditure of companies (power plants, the industry, etc.) for workplace safety;
- Increased expenditure of companies (power plants, the industry etc.) for replacing equipment which contains or is contaminated by PCB, and its disposal in an environmentally acceptable manner;
- Increased expenditure of the public sector on management, monitoring and inspection.

*Action plan 3.3.4: Production, import and export, usage, identification, labelling, removal, storage and disposal of PCB and equipment containing PCB* is described in detail in Chapter 3.3.4 and identifies measures and activities which need to be conducted in order to ensure the implementation of the Stockholm Convention in BiH, which requires the signatory country to, among other things:

- Identify, label and remove PCB from usage in equipment (transformers, capacitors or other containers which contain liquid supplies) until 2025, and
- Dispose of waste which contains PCB in an environmentally acceptable manner until 2028 at the latest (liquid which contains PCB and equipment contaminated by PCB, with PCB content higher than 0.005%).

<sup>137</sup> Guidelines for the Identification of PCBs and Materials Containing PCBs, UNEP, 1999.

*Action plan 3.3.4*, among other things, includes the following activities:

- Improvement of legal and institutional framework for PCB management;
- Detailed inventory of equipment which contains or is contaminated with PCB;
- Creation and implementation of a Plan for phasing out of equipment which contains or is contaminated with PCBs;
- Ensuring adequate temporary storage of equipment which contains or is contaminated with PCB;
- Creation of a Plan for the disposal/decontamination of equipment which contains PCB and PCB waste;
- Establishment of temporary storage for PCB waste, as part of storage for hazardous waste;
- Safe final disposal of equipment which contains PCB.

The PCB Inventory Group assessed that the financial resources needed for the implementation of the plan amount to around 736,500 BAM. However, it is necessary to mention that these resources do not include:

- The cost of replacing equipment and its disposal, which was not possible to determine at this phase of the project. It will be possible to determine the necessary financial resources after the creation of a detailed inventory and after the creation of a plan for excluding the use of/decontamination of equipment which contains or is contaminated by PCB (which is the responsibility of the owner of the equipment). In accordance with the recommendations of the Basel Convention, the approximate cost for the disposal of PCB waste is 5 USD/kg;
- Resources for the establishment of temporary storage for hazardous waste, given that this issue needs to be solved in the context of the overall sector of waste management and is not limited to the requirements of this project.

Part of the equipment which contains or is contaminated by PCB and PCB waste in the amount of 106 t that was identified during the preparation of the preliminary inventory, and which is ready for export, is envisaged to be disposed of through the implementation of the *Med Partnership project, Subcomponent 2.3. „Environmentally Sound Management of equipment, stocks and wastes containing or contaminated by PCBs in national electricity companies of Mediterranean countries“*. The project envisages that this export be realised by the end of 2014.

However, in the case of companies which still possess equipment which contains or is contaminated by PCB, they will have twofold expenditure – for the disposal of existing contaminated equipment, and the procurement of new equipment. Apart from that, after getting new equipment, each company needs to enable professional training of staff for the needs of maintaining the new equipment. Considering the current state of the BiH economy, the owners of the equipment will not be able to cover the expenses of replacing the equipment and its disposal on their own, so financing from alternative sources will be necessary. With that in mind, BiH will have to apply for additional resources from international financial mechanisms (donations, projects).

The implementation of measures identified in the *Action plan 3.3.4*. (along with the implementation of relevant measures from *Action plan 3.3.1: Institutional and regulatory measures of strengthening*, and from the *Strategy with an action plan 3.3.13: Identification of contaminated locations (Annex A, B and C) and remediation in an environmentally acceptable manner*) will contribute to the reduction of the negative effects of PCB on the environment and people's health (especially people who are professionally exposed to PCB, and people who live near locations which are contaminated by PCB, some of which are identified in Chapters 2.3.6.4 and 2.3.14). Even though it is not possible to determine the connection between environmental pollution by PCB and people's health because of the lack of studies and research in BiH, the implementation of this action plan can have indirect benefits in the sense of reduced expenditure for healthcare due to health problems which may be caused by PCB in the environment.

### **2.3.17.2 Polybrominated diphenyl ethers (PBDEs)**

Chemicals with the collective name of PBDEs were used mostly for the treatment of polyurethane foams which were used in the transport sector. Besides that, PBDEs were used in the production of casings for electrical and electronic equipment (EEE).

Considering that PBDEs were produced and used in the period of 1975-2004, the most significant socio-economic effects of these chemicals were caused by the import of used vehicles, which were produced prior to 2004, into BiH. According to the data of the Agency for Statistics of BiH, the total number of used cars produced prior to 2005, and imported into B&H in 2012 was:

▪ automobiles	69,425
▪ trucks	30,773
▪ buses	2,253

Based on the estimate from the preliminary inventory which was created by the Group for the inventory of PBDEs/PFOS, the amount of PBDEs in the transport sector of cars imported in 2012 is over 900,000 kg, while the amount of this chemical in electric and electronic equipment which is in stock at the level of the user, is over 10,000 kg.

The negative effects of the import and usage of used vehicles is significant in the sense of the impact on the environment, and thereby on people's health, because of:

- Greater emissions of pollutants into the air (older types of engines (EURO 1,2,3) have greater emissions NO<sub>x</sub>, SO<sub>2</sub>, CO<sub>2</sub> i PM<sub>10</sub> than vehicles with newer types of engines which are in line with new EURO standards);
- Reduced air quality, especially in urban areas;
- The impact on the occurrence of respiratory illnesses and allergies, as a result of air pollution;
- Reduced safety of drivers and passengers;
- Increase in waste which occurs because of vehicles at the end of their life cycle.

Individuals and companies have an indirect impact in the economic sense when they use vehicles like these because of:

- the higher usage of petrol compared to that of new vehicles;
- the more frequent breakdowns which have a direct impact on the budget of the individual user or the efficiency of the company;
- the more frequent servicing of vehicles and oil change;
- the higher expenditure on preventative maintenance of vehicles.

In BiH so far studies have not been conducted in order to document the effect of PBDEs on people's health, to analyse the increase in traffic accidents or to assess the economic effects on the budget of individual users or companies, due to the import of used vehicles.

However, in any event, in the following period it will be necessary to adequately dispose of a part of the imported used vehicles, given that they will become waste in the meantime. The inadequate disposal of discarded vehicles represents a risk for soil and subterranean water pollution, which as a consequence has an impact on people's health. Besides that, the problem becomes more complex due to the effects of the use of electrical and electronic equipment which contains PBDEs.

In the economic sense, until 2013, in BiH the import of used vehicles was subject to customs tax, but from 1 January 2013, the total abolition of customs duties came into force for a certain number of products originating from the European Union (EU) and being imported into BiH, including used passenger vehicles. Therefore, BiH has no income in its budget from the import of used vehicles. The only positive effect in the economic sense is on auto scrap yards, which take over one part of old vehicles, however, a large part of old vehicles still end up being disposed of inadequately. The PBDEs/PFOS Inventory Group did not manage to obtain data about further activities at auto scrap yards, therefore there is the possibility of a negative impact on the health of workers who work at auto scrap yards and who can come into contact with PBDEs during the process of dismantling old vehicles.

*Action plan 3.3.5: Production, import and export, usage, supply and waste of hexaBDE and heptaBDE (Annex A, part IV) and tetraBDE and pentaBDE (Annex A, part V) which is shown in Chapter 3.3.5 identifies the legal, institutional, technical and other measures which ensure an adequate framework for the management of PBDEs in BiH, in accordance with the regulations of the Stockholm Convention.*

The PBDEs/PFOS Inventory Group assessed that the financial resources necessary for the implementation of the plan amount to around 557,000 BAM. These resources do not include



the costs of establishing authorised operators for waste management of electrical and electronic equipment in RS and BD, the cost of which is estimated to be 750,000 BAM per entity. These companies could be established after passing the appropriate legal regulations in RS and BD, and their establishment is viewed in the context of the overall sector of waste management and is not limited only to the needs of this project. Besides that, the PBDEs/PFOS Inventory Group could not make an assessment of the necessary resources for the implementation of some of the foreseen activities (e.g. establishment of authorised centres for the disposal of discarded vehicles, the procurement of adequate equipment for the quick detection of the presence of PBDEs in electrical and electronic equipment, discarded vehicles and furniture, the safe final disposal of equipment which contains PBDEs, etc.) in this phase. These financial resources could be determined only after the finalisation of certain activities, as foreseen by the plan.

The implementation of measures identified in *Action plan 3.3.5.* (along with relevant measures from *Action plan 3.3.1: Institutional and regulatory measures of strengthening*) will contribute to the reduction of negative effects of PBDEs on the environment and people's health (especially the population in urban areas, due to lesser air pollution, and people who work at auto scrap yards and who can come into contact with PBDEs during the dismantling of old vehicles). Besides that, the establishment of centres for the disposal of discarded vehicles, and the establishment of operators for waste management of electrical and electronic equipment and so on will also mean the opening of new workplaces and income for companies which deal with this type of waste disposal.

### 2.3.17.3 Perfluorooctanesulfonate (PFOS)

According to PFOS Guidelines (UNEP 2012.), PFOS-related substances have been in production for over 50 years, and products which contain PFOS are textiles, furniture, clothes, leather goods and various industrial and household cleaning products. The application of PFOS in fire-fighting foams for putting out fires that are caused by liquid fuels is also significant. The preliminary inventory of PFOS in BiH has shown that BiH has never been a producer of PFOS, but it just imports PFOS and uses products which may contain PFOS.

Based on national statistical data, the PBDEs/PFOS Inventory Group made an assessment of the amount of PFOS in BiH in 2012. The estimated amount is in the range of 47 t/year to 284 t/year, and the inventory was focused on those commodity flows where, according to PFOS Guidelines (UNEP 2012.), the occurrence of PFOS was most significant: fire-fighting foams, certain medical equipment, insecticides, coatings and products for textile and carpet impregnation, coatings and additives to coatings and cleaning and polishing products.

PFOS can end up in the environment during a production process, during commercial application and after the inadequate disposal of an end product. In BiH so far specific studies have not been conducted in order to analyse the presence of PFOS compounds in the BiH environment and its impact on people's health.

*Action plan 3.3.7: Production, import and export, usage, supply and waste of PFOS, its salts and PFOSF (Annex B, Part III)* which is shown in Chapter 3.3.7 identifies the activities and measures which need to be implemented for the reduction, gradual exclusion from use and final discontinuation of PFOS usage and the equipment which contains or is contaminated by PFOS.

The PBDEs/PFOS Inventory Group assessed that the financial resources required for the implementation of the plan amount to around 320,000 BAM. However, the Group for the inventory of PBDEs/PFOS could not make an assessment of the necessary resources for the implementation of some of the foreseen activities (e.g. safe final disposal of equipment which contains PFOS, the creation of plans for the gradual switch to alternatives to PFOS along with the application of BAT/BEP, etc.) in this phase. These financial resources could be determined only after the finalisation of certain activities as was foreseen by the plan and BiH will need to apply for resources from international financial mechanisms.

The implementation of measures mentioned in *Action plan 3.3.7.* (along with relevant measures from *Action plan 3.3.1: Institutional and regulatory measures of strengthening*) will contribute to the reduction of the negative effects of PFOS on the environment and people's health (workers who are professionally exposed to PFOS (fire-fighters, workers in the metallurgical industry, workers in the leather and textile industry), and the general population which uses household cleaning appliances which contain PFOS, etc.).

### 2.3.17.4 Unintentionally produced POPs - polychlorinated dibenzodioxins and dibenzofurans (PCDD/PCDF)

Dioxins and furans are synthetic chemical compounds which do not appear in nature, but come about as unwanted/byproducts of waste emissions in industrial processing and production, through the combustion of almost all organic matter in the presence of chlorine or its organic or inorganic compounds.

The preliminary inventory which was created by the PCDD/PCDF Inventory Group based on UNEP guidelines<sup>138</sup> showed that the most significant way of releasing PCDD/PCDF in BiH is by release into residue/waste (55.23 %), into the air (43.69 %), and the rest (1.08 %) is embedded in products (during the production of chemicals and consumer goods) and deposits in water and soil. The most unintentionally produced POPs in waste are created during the production of iron and non-ferrous metals (65.45 %), and the most emissions from unintentionally produced POPs into the air are created during the production of power and heat (65.24 %).

The socio-economic effects related to unintentionally released POPs include:

- Negative effects on human health, especially the population which lives near industrial plants;
- Reduced quality and standard of living;
- Reduced income of companies (industry) due to increase of expenditure on workplace safety;
- Increased expenditure of companies (industry) on activities related to the prevention and reduction of pollution;
- Increased expenditure of the public sector on management, monitoring and inspection.

During the creation of the inventory, the Environment, Health, Research and Development Group did not manage to find data on systematic research of the effects of POPs (also including PCDD/PCDF) on people's health and the environment in BiH. With the goal of analysing the effects of POPs on people's health, which also includes PCDD/PCDF (see Annex 11), and in the absence of local studies, the Group analysed the available data from literature and studies which are available to the general scientific community, and relevant professional journals. Even though the analysed studies point to the potential genotoxic and carcinogenic effects of POPs, due to the lack of cohort studies, the Environment, Health, Research and Development Group could not determine which parts of the population in BiH are classified as being particularly at risk.

Based on internationally recognised research, Chapter 2.3.14 identifies the risk groups which represent people who are professionally exposed to the effects of POPs, whether it be ingested through the air, skin contact, or orally.

As is the case with other chemicals, the health risks depend on multiple factors: manner of exposure (through food, water, air, etc.), frequency of exposure (once or daily), health condition of the individual etc. It is necessary to emphasise that the negative effects of releasing PCDD/PCDF on health can also be reflected in the economic sphere of social life due to:

- Reduced income because of reduced working capacity, as a result of illness caused by exposure to PCDD/PCDF;
- Increased expenditure on treatment of illness, and in the worst case scenario
- Losing income in case of death.

From the company aspect (industry), social and economic effects can include:

- Increased expenditure on treatment of workers and health insurance;
- Increased expenditure on introducing measures of prevention and reduction of pollution, and controlling the emissions of PCDD/PCDF;
- Increased expenditure related to introducing principles for cleaner production, betterment of technological processes (IPPC installations), in accordance with BAT/BEP recommendations;
- Increased charges for establishing integrated waste management.

Besides the industrial sector, the public sector can also have certain expenses when it comes to strengthening the capacity of authorised institutions, and the implementation of monitoring, control and inspection.

<sup>138</sup> UNEP "Toolkit for Identification and Quantification of Release of Dioxin and Furan and other Unintentional POPs" (UNEP 2013).

*Action plan 3.3.9: Measures for the reduction of emissions from unintentional production* which is shown in Chapter 3.3.9 identifies the measures which ensure an adequate framework for the management of PCDD/PCDF in BiH, in accordance with the regulations of the Stockholm Convention.

The PCDD/PCDF Inventory Group assessed that the financial resources required for the implementation of the plan amount to around 554,500 BAM along with 25 – 35 million BAM required for the realisation of activities related to the implementation of BAT/BEP measures in the production of iron and non-ferrous metals which are identified as the biggest emitters of unintentionally produced POPs in waste. The PCDD/PCDF Inventory Group could not determine the necessary resources for the implementation of some of the foreseen activities in this phase, such as, for example, the application of resources for the reduction of unintentionally produced POPs in the environment from other sources based on the recommendations of BAT and BEP. The amount of necessary resources could be determined when all companies and institutions who need to apply BAT and BEP determine them individually. Based on the Convention, companies are required to possess equipment for the treatment of waste gases and/or waste which causes the emissions of polluting gases into the environment. This type of equipment requires financial resources and trained staff which can handle the equipment.

The mobilisation of financial resources is of utmost importance for the sustainability and implementation of the Convention and it is also somewhat possible to achieve that through resources from environmental funds, however, it certainly means allocating additional resources for companies and the state. The implementation of principles of cleaner production and application of BAT/BEP in the industry based on the Convention is performed in accordance with the capacity of the state. However, considering the lack of financial resources required for the implementation of these measures in BiH, the Convention states the possibility of obtaining technical and financial assistance from developed countries, so BiH will have to apply for additional resources from financial organisations and international environmental funds.

### **2.3.18 THE IMPORTANCE OF EMBEDDING THE GENDER EQUALITY ISSUES IN THE NIP FOR THE STOCKHOLM CONVENTION IN BIH**

Within the socio-economic assessment as part of creating the NIP in BiH, the issue of gender equality is also embedded in the planning and implementation of the project. Adequate management of POPs is closely related to economic and social development. In many cases, the poorest parts of the world population consistently have the highest risk of exposure to hazardous chemicals because of their type of work, living conditions, as well as a lack of knowledge about safe handling practices for those chemicals<sup>139</sup>. Research of the World Health Organization (WHO) states that long-term, continuous exposure to hazardous chemicals in water, food, soil and air can cause various health problems, including damage to the reproductive and neurological system.

Numerous social and biological factors determine the level of exposure to hazardous chemicals, and their effect on human health. Considering that women, men and children are different when it comes to physiological sensitivity to the effects of exposure to hazardous chemicals, special attention has to be given to the connection between the issue of gender and the effect of chemicals<sup>140</sup>.

Women are particularly sensitive to hazardous chemicals:

- Because they are susceptible to the special effects of hazardous chemicals because of the structure of their reproductive system<sup>141</sup>;
- Because of the lipophilic characteristic of most hazardous chemicals, as their effect is bigger on women, considering that women most often have a higher proportion of fat tissue, and there is a higher possibility of storage of dangerous chemicals in the body<sup>142</sup>;
- In certain periods of their life, such as pregnancy, breastfeeding, menopause and so on.

139 UNDP (2011): Chemicals and Gender

140 *ibid*

141 Roche, Daniela (2006): Women's Toxic World. Women in Europe for a Common Future.

142 UNDP (2011): Chemicals and Gender

Fetuses, infants and children are especially sensitive to POPs, as it was stated in the WHO study<sup>143</sup>:

- Exposure to POPs in early phases of life can have an effect on the development of the nervous system and the endocrine system, not only in the womb and childhood, but also in later phases;
- Children proportionally ingest higher amounts of chemicals through water, air and food (in relation to body size), which increases the risk of harmful effects<sup>144</sup>.

Caring for female health needs to be taken into account especially during management of chemicals because mother's milk collects and preserves persistent organohalogenes, including POPs.<sup>145</sup> Lipophilic POPs are transferred to mother's milk because of the high fat content. During breastfeeding, an infant can reach as much as 14% of lifelong cumulative exposure to dioxins and PCB in 6 months, and "this exposure can have a significant impact on the body of a child when it reaches adult and reproductive age"<sup>146</sup>.

Despite the biological factors which determine sensitivity to the effects of exposure to poisonous chemicals, factors related to the type of workplace and roles within households can also have an effect on the volume of exposure to hazardous chemicals. Therefore, the level of chemical exposure is often determined by sex, as women and men often perform different professional duties. The International Labor Organization (ILO) notices that hazardous chemicals kill around 438,000 workers per year, and 10% of all skin cancers are estimated to be a consequence of exposure to hazardous chemicals in the workplace<sup>147</sup>. Furthermore, because of their professional duties, women are dominantly exposed to chemicals in the health sector (nurses, pharmacists), and in the textile industry. Besides that, a project which takes into account the issue of gender equality also needs to include the needs of men. For example, in agricultural communities in developing countries men can be directly exposed to chemical pesticides during their application, while women can be exposed to chemicals during the process of planting and harvesting. Apart from that, people can be exposed to a higher risk of poisonous chemicals in handicrafts and in work in gold ores, the leather industry and mechanical workshops (UNDP, 2011:7<sup>148</sup>).

### 2.3.18.1 Inclusion of the issue of gender equality in the NIP of BiH

The term "gender" indicates the attributes and capabilities related to males and females, as well as the relationship between men and women, boys and girls, and the relationships between women themselves and men themselves. These attributes, capabilities and relationships are socially constructed and learned through socialisation processes, and are therefore determined contextually and time-wise, but they are also changeable.<sup>149</sup>

On the other hand, including the issue of gender equality in public policies can be defined as "a process of assessing the effect of planned actions on men and women, including the domain of legislature, politics or programs, in all fields and on all levels. It is a strategy for enabling female and male issues and experiences to be an integral part of constructing, implementing, monitoring and evaluating policies and programs in all political, economic and social spheres"<sup>150</sup>.

Furthermore, the aim of the process of integrating the issue of gender equality is to achieve gender equality which is defined by the UN as men and women and boys and girls having equal rights, obligations and capabilities. Gender equality means that the interests, requirements and priorities of women and men have to be taken into account, admitting the diversity of different groups of women and men. Gender equality is not a female issue, but rather it needs to wholly include men and women.

In accordance with UNIDO *Guideline for Gender Mainstreaming for NIP Update Projects on Persistent Organic Pollutants (POPs)*, the steps in the process of achieving gender equality need to be embedded in all parts of the NIP project cycle – the preparation, formulation, implementation, monitoring and evaluation.

143 WHO (2010): Persistent Organic Pollutants - Impact on Children's Health.

144 UNDP (2011): Chemicals and Gender

145 WHO (2010): Persistent Organic Pollutants - Impact on Children's Health.

146 *ibid*

147 UNDP (2011): Chemicals and Gender

148 *ibid*

149 UNIDO (2009): Policy on Gender Equality and the Empowerment of Women. General Bulletin.

150 UNECSOC: Coordination of the Policies and Activities of the Specialized Agencies and other Bodies of the United Nations System. Mainstreaming the gender perspective into all policies and programmes in the United Nations system. Report of the Secretary-General. E/1997/100.

When it comes to the processes of preparatory activities in terms of integrating the issue of gender equality, conducting the analysis of the sexes is the most important part of the preparation process. The analysis of the sexes relates to various methods which are used for understanding the relationship between men and women, their approach to resources, their activities and the limitations they face in relation to others. The analysis of the sexes helps to make a decision on the inclusion of certain activities in the project.

According to the previously mentioned UNIDO Guidelines, the analysis of the sexes consists of the following elements:

- Gathering relevant data – all relevant gathered data has to be separated by gender in order to enable insight into various influences on men and women. Data classified by gender are quantitative statistical data on the differences and inequality between men and women<sup>151</sup>;
- Analysis of data for determining relevant issues of gender equality: understanding institutional, economic, social and political contexts;
- Integration of consideration of planning and implementation of proposed interventions.

Furthermore, in accordance with the mentioned guidelines, the analysis of the sexes is performed at three levels:

- Contextual analysis of sexes at state level – macro level – analysis of policy framework (international and national policies, analysis of the approach to education and level of education, analysis of economic, legal, political and social involvement, analysis of approach to financing);
- Analysis of sexes by sectors – mezzo level (if applicable) - gathering and analysis of classified data which will illustrate current gender inequality in targeted sectors;
- Mapping potential partners, associates and stakeholders – identification and inclusion of partners and stakeholders involved in the issue of gender equality in the preparation phase.

#### **Regulatory framework and implementation of defined priorities for gender equality in BiH**

The integration of the issue of genders is an instrument which is used for the integration of standards of gender equality in all segments of social life, i.e. in all policies and programs which are created by authorised government institutions.

The *Law on Gender Equality in BiH* (Official Gazette of BiH, no. 16/03 and 102/09) determined the commitments of all government institutions to take the appropriate and required measures for implementing the measures set by this Law and the Gender Action Plan (GAP) of BiH (Ministry for Human Rights and Refugees of Bosnia and Herzegovina, Agency for Gender Equality of BiH, 2007.). Besides this Law, *Unique rules for accepting and processing requests for assessing violations of the Law on Gender Equality in BiH* were created and implemented (Official Gazette of BiH, no. 71/12) and they regulate the implementation of the Law at the level of BiH. These legislative acts function at the level of BiH, while at the level of Entities there are no relevant legal frameworks, and the legal framework of BiH is implemented for the needs of regulating the issue of gender equality.

Integration of the standards of gender equality in all government policies, strategies, work programs and budgets is achieved in close cooperation with gender institutional mechanisms and institutions of the system which are responsible for the application of these standards and monitoring the state of certain fields of social life and work, however, gender equality is still not treated as a priority of development and other strategies, generally and in certain fields, and is still understood as a „female issue“.

The commitments which stem from the *Law on Gender Equality* in BiH and GAP are the following:

- Introduction and application of international and local standards for gender equality, as a commitment which directly or indirectly regulates the issue of gender equality;
- Conducting analyses of laws, strategies, action plans, programs and other acts from the aspect of gender equality (gender analysis);
- Keeping statistical evidence, analysis and regular publishing of data, classified by gender;

<sup>151</sup> Reves, H. and Baden S. (2000): *Gender and Development*. Institute of Development Studies, Great Britain.

- Creation and implementation of measures for the betterment of gender equality in institutions in accordance with commitments from the *Law on Gender Equality in BiH*;
- Conducting trainings on gender equality;
- Conducting promotional activities, information campaigns and campaigns for raising awareness about gender equality;
- Regular monitoring and reporting about the progress of institutions in applying international and local standards for gender equality.

At the BiH level, fulfilling these commitments is the role of the Agency for Gender Equality of BiH, Gender Centre of FBiH and Gender Centre of RS. At the state level, apart from the mentioned institutions, there is also the Commission for Gender Equality which was founded by the Parliamentary Assembly of BiH. At the entity level, in the House of Representatives and the House of Peoples of the Parliament of FBiH, the Commission for Gender Equality of the House of Representatives was formed and the Commission for Gender Equality of the House of Peoples, and in the National Assembly of RS, the Committee for Equal Opportunities was formed. Within the FBiH Government and the RS Government focal persons were appointed for gender issues in every ministry. At the cantonal level, commissions for gender issues were formed in cantonal assemblies, and in cantonal governments coordinating committees were formed for gender issues. In 21 municipalities in BiH and their municipal councils/municipal assemblies as well as mayors' offices committees were formed for gender issues.

Apart from the institutional framework, there is a network of NGOs which support the rights of women and gender equality through their activities, which are primarily based on counselling and providing psychological support. Some of the organisations are Medica Zenica, Žene ženama (Women for Women), Udružene žene Banja Luka (United Women in Banja Luka), Forum žena Bratunac (Women's Forum in Bratunac), Horizonti Tuzla (Horizons in Tuzla), Žena BiH Mostar (Woman of BiH in Mostar), Žene s Une Bihac (Women from Una in Bihac), TPO Sarajevo, Vive žene Tuzla (Vive Women in Tuzla), Lara in Bijeljina, Izvor Prijedor (Source in Prijedor), Budućnost Modrica (Future in Modrica), and NGO Renesansa (Renaissance).

These institutions, and especially the government institutions, function through a series of instruments which help implement the commitments from the *Law on Gender Equality in BiH* and the mentioned *Unique rules for accepting and processing requests for assessing violations of the Law on Gender Equality in BiH*, including the laws, strategic documents, manuals and international documents:

#### 1. Strategic documents in the field of gender equality

- Gender action plan of BiH, 2013 – 2017;
- Action plan for the implementation of the UN Resolution 1325 „Women, peace and security”, from 27.07.2010 (Official Gazette of BiH, no. 92/10);
- Strategy for preventing and combating domestic violence for BiH (Official Gazette of BiH, no. 70/09);

#### 2. Manuals and international documents

- Manual for harmonising laws with the Law on Gender Equality and with international standards in the field of gender equality, Sarajevo, 2011;
- Recommendation no. 17 of the Committee of Ministers of the Council of Europe, 2007;
- Manual for parliamentarians which relates to the application of the Council of Europe Convention on preventing and combating violence against women and domestic violence.

International documents in the field of gender equality which stem from conventions that BiH ratified were also translated and published, including international documents at the level of the United Nations and the Convention of the International Labour Organization of the UN (ILO).

#### **Integration of priorities in gender equality issues through the creation of an action plan (activities related to raising public awareness)**

Considerations which relate to gender equality are an integral part of the envisaged action plans within the NIP, whose activities are, where possible, created in a gender-sensitive context. The shortcomings which prevent the creation of a more detailed set of activities related to gender equality are the lack of data on gender differences in BiH, as well as the

absence of a system for monitoring basic estimates in relation to the effects of POPs on human health. Therefore, during the implementation of action plans, and during the update of the NIP document in the following period, it is necessary to pay extra attention to gathering data which is aggregated by gender. These data will serve as a basis for creating subsequent activities related to gender equality in the context of the implementation of the NIP.

Raising awareness about the link between exposure to hazardous chemicals, the effects on human health and gender differences when it comes to risk and effects is of vital importance. Raising awareness about current health risks from toxic chemicals which are used or are included in different types of equipment in sectors where, during the creation of the preliminary inventory of POPs in BiH, the presence of POPs chemicals was identified, is very important for the successful implementation of other identified activities. In order to achieve the desired goal of raising public awareness, it is necessary to implement the following activities:

- Development and distribution of guidelines which contain information about hazardous chemicals, health and gender differences and effects;
- Provision of information about social factors which have an effect on human exposure to chemicals, such as, for example, the division of labour;
- Inclusion of health- and gender-related information during thematic trainings;
- Dissemination of material for raising awareness of all involved stakeholders.

#### **Enabling broad participation of various relevant stakeholders**

Considering that the management of POPs is a cross-sectoral issue, providing a multifaceted approach by stakeholders is necessary for the implementation of the project in a gender-sensitive manner. Among key stakeholders, the previously mentioned focal points for the issue of gender equality in public institutions need to take active participation in the project, as well as universities, research centres, laboratories, and NGOs.





### 3 STRATEGY AND ACTION PLAN ELEMENTS OF THE NATIONAL IMPLEMENTATION PLAN

- 3.1 POLICY STATEMENT
- 3.2 IMPLEMENTATION STRATEGY
- 3.3 ACTIVITIES, STRATEGIES AND ACTION PLANS
- 3.4 IMPLEMENTATION TIMELINE WITH RESOURCE NEEDS ASSESSMENT
- 3.5 RESOURCE REQUIREMENTS FOR NIP IMPLEMENTATION



## 3.1 POLICY STATEMENT

Recognizing that persistent organic pollutants are non-degradable chemicals - pollutants that are released into the environment as a result of human activities, primarily industry;

Recognizing that persistent organic pollutants possess properties of persistence and bio-accumulation and potential for transport over long distances through various environmental media (air, water and migratory species);

Aware of the adverse effects which persistent organic pollutants may cause to human health and the environment;

Recognizing the importance of developing the concept of “cleaner production”, environmentally sound management of chemicals and hazardous waste; and

Committed to protect human health and the environment from the adverse effects of persistent organic pollutants

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will undertake all measures and activities necessary for the fulfilment of all obligations assumed by signing the Stockholm Convention, primarily for:

- Strengthening institutional capacity and the establishment of a legal framework to ensure adequate management of persistent organic pollutants;
- Establishing control over the traffic and use of persistent organic pollutants;
- Gradual reduction and elimination of deliberate use of persistent organic pollutants, and the reduction of unintentionally produced emissions;
- Establishing control over the management of chemicals and hazardous waste;
- Improving the monitoring of persistent organic pollutants presence in the environment and living organisms;
- Active involvement of professional institutions in solving issues related to persistent organic pollutants;
- Ensuring public access to information by all target groups and the public.

## 3.2 IMPLEMENTATION STRATEGY

NIP is a detailed overview of the measures that need to be taken in BiH, the responsibilities of measures and the necessary resources required for the implementation of measures in order to fulfil the provisions of the Stockholm Convention. The activities envisaged by the NIP are aimed at improving management of chemicals and wastes through comprehensive techniques for solving problems related to POPs. The implementation of the action plans, which address different aspects of managing POPs throughout their entire life cycle, will enable the fulfilment of all the specific requirements of the Stockholm Convention.

The formal implementation of the NIP is expected to commence in 2015/2016, after the adoption of the document and providing necessary financial resources. Most of the activities in the action plans are planned to be realized during the first five years of the implementation of NIP, whereas the time limit for the implementation of other activities, for example elimination of the use of PCBs, will be extended until the deadline specified by the Convention.

### **3.2.1 PRIORITIES FOR POPs MANAGEMENT IN BIH AND THE CONDITIONS FOR THEIR REALIZATION**

The main objective of the NIP is to protect the environment and human health from the adverse effects of POPs chemicals. In order to achieve this objective and meet the obligations arising from the Stockholm Convention, and based on the results of the preliminary inventory of POPs in BiH conducted in the period from May to December 2013, the priorities for the management of POPs in BiH were set (Table 164).

The priorities were approved by the stakeholders at the Priority Validation Workshop within the preparation of the NIP for the Stockholm Convention in BiH, which was held in Sarajevo on 24 April, 2014. The process of priority setting within Phase III is described in Chapter 1.2, and the list of workshop participants is given in Annex 3.

Priorities and objectives
<p>1. Improving and creating an adequate legal framework related to all aspects of management of POPs chemicals listed under the Stockholm Convention and aspects of environmental protection (including hazardous waste)</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Legislation that ensures the fulfilment of all obligations under the Stockholm Convention developed/ amended/ revised and adopted at the level of BiH, FBiH, RS and BD</li> <li>2. Laws and bylaws related to the management and monitoring of chemicals that are listed under the Stockholm Convention harmonized with EU Regulations, which necessitates amending bylaws regulating the emission limit values and action levels</li> <li>3. Chemical Profile of BiH developed</li> </ol>
<p>2. Strengthening the capacities for monitoring of POPs in the environment and humans, including the identification of waste and locations potentially contaminated with POPs ("hotspots")</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Strengthened/built capacities for timely and systematic monitoring of POPs substances in air, water, soil, food and living organisms<sup>152</sup></li> <li>2. In the institutions entrusted with the responsibility and liability for POPs monitoring, all the necessary preparations to ensure the accreditation of laboratories according to BAN ISO/IEC 17025 and implement the principles of quality assurance and control and Good Laboratory Practice (including the establishment of Standard Operating Procedures (SOPs) for sampling) are carried out</li> <li>3. Opportunities to acquire knowledge, skills and competencies and their transfer to state institutions responsible for POPs monitoring are provided through the funding of scientific research projects to be implemented in institutions for scientific research and higher education in BiH</li> <li>4. Developed, adopted and implemented programs for monitoring of POPs in body fluids and biological materials of human or animal origin, as well as in food and the workplaces</li> <li>5. Completed detailed inventory of sites contaminated with POPs in BiH</li> <li>6. Conducted risk assessment with drawn conclusions about the importance of exposing the BiH population to POPs in terms of public health</li> </ol>
<p>3. Reduction of emissions of unintentionally produced POPs (Annex C) from industry and other sources and strengthening the inspection and other capacities for control</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Established regular monitoring and assessment of sources and releases of unintentionally produced POPs</li> <li>2. Information on the experiences of applying the principles of cleaner production in industry and agriculture, and information on the Best Available Techniques (BAT) and Best Environmental Practices (BEP) for improving productivity and reducing negative environmental impacts are provided</li> <li>3. Achieved reduction of unintentionally released POPs emissions from Annex C of the Convention for the main identified sources</li> <li>4. Ensured implementation of good agricultural practices to reduce emissions of unintentionally produced POPs from agricultural activities</li> </ol>
<p>4. Strengthening the technical capacities for collecting, organizing, structuring and processing data on POPs in BiH, including the establishment and coordination of information systems in FBiH, RS and BD and improving the exchange of information between the competent institutions</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Established and operational information systems for the management of chemicals in FBiH, RS and BD</li> <li>2. Established and operational information systems for the management of hazardous waste in FBiH, RS and BD</li> <li>3. Strengthened mechanism for exchange of information between the competent institutions horizontally (between the entities and BD) and vertically (between the entities, BD and state)</li> </ol>
<p>5. Ensuring adequate management of hazardous wastes (with a focus on waste containing POPs substances) and contaminated areas ("hotspots")</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Adopted/harmonized regulations in FBiH, RS and BD governing the management of special waste categories, including waste containing PCBs, EEO and disposed vehicles</li> <li>2. Adopted/harmonized regulations in FBiH, RS and BD governing the management of contaminated areas (defining contaminated areas, the liability framework for contaminated areas, etc.)</li> <li>3. Preliminary registry of contaminated sites is established by 2017</li> <li>4. Established, harmonized and operational management systems for special categories of waste, including waste containing PCBs, EEE and end-of-life vehicles</li> <li>5. A system of hotspot management and remediation is established by 2018</li> <li>6. Remediation of priority hotspots is carried out by 2020</li> <li>7. Strengthened control mechanism for management of specific waste streams, particularly in areas where system operators have the leading role (e.g. waste from EEE)</li> </ol>

*Table 164:  
Priorities and objectives  
of POPs management  
in BiH*

<sup>152</sup> Although reference centers for air, water and waste that have been formally appointed for coordination and verification of data at the entity level, their responsibilities in the context of the Stockholm Convention should be detailed and more clearly defined.

Priorities and objectives
<p>6. Ensuring adequate management of PCBs and equipment containing or contaminated with PCBs, including prior detailed inventory</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Developed detailed inventory of equipment containing or contaminated by PCBs</li> <li>2. Plan for phasing out of equipment containing or contaminated by PCBs developed and fully implemented by 2025</li> <li>3. Ensured adequate temporary storage of equipment containing or contaminated by PCBs until its final disposal</li> </ol>
<p>7. Establishment of coordination mechanism and enhancement of the institutional framework for the implementation of the Stockholm Convention, and allocation of responsibilities for all aspects of POPs management in existing institutional frameworks</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Established coordination mechanism for the fulfilment of BiH's obligations under the Stockholm Convention and reporting to the Convention Secretariat</li> <li>2. Established comprehensive systems/mechanisms for management of chemicals in BiH, FBiH, RS and BD</li> <li>3. Strengthened capacities for amendments to and the effective enforcement of adopted legislation through training and educating relevant staff</li> <li>4. Inspection capacities additionally trained and enhanced.</li> </ol>
<p>8. Introduction of economic measures for environmental protection and the implementation of the Stockholm Convention</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Introduced subsidies for activities for activities to prevent and control pollution</li> <li>2. Introduced penalties for non-compliance with regulations on the emission of pollutants</li> <li>3. Introduced environmental fees related to: <ul style="list-style-type: none"> <li>import, manufacture and/or use of specific materials or substances that are potential sources of POPs chemicals;</li> <li>unintentional releases of POPs into the environment (Annex C);</li> <li>environmental burden caused by all types of waste.</li> </ul> </li> </ol>
<p>9. Education and raising awareness among the public and target groups</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Developed effective instruments for information dissemination on POPs</li> <li>2. Identified stakeholders actively involved in the management and decision-making matters relevant to the implementation of the Stockholm Convention</li> <li>3. Undertaken activities to educate and raise awareness among target groups (decision-makers, industry and the public) of the obligations under the Convention (developed and implemented non-cyclical aspects of education as a form of lifelong learning, ranging from specialization in universities to specifically designed courses intended for employees in administrative bodies, institutions nominated for the implementation of certain segments of the Stockholm Convention, as well as employees in the industry)</li> <li>4. Developed and implemented a formal higher education program of the first cycle, and especially the second and third cycles (Bologna concept of studies), to include issues related to POPs</li> </ol>
<p>10. Establishment of criteria and mechanisms for the customs control of import, export and transit of pesticides, used cars, EE equipment, and other equipment and products that potentially contain POPs</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Strengthened mechanism for controlling import of chemicals (including POPs chemicals), second-hand cars, EE equipment, and other equipment and products potentially containing POPs</li> <li>2. Strengthened control mechanism for the prevention of illegal import/export of chemicals, including POPs chemicals</li> </ol>
<p>11. Enabling public access to all information related to the implementation of the Stockholm Convention, the results of the monitoring of pollutants and the results of health studies on the effects of POPs on the population in BiH</p> <p>Objectives:</p> <ol style="list-style-type: none"> <li>1. Developed a cooperative information system between relevant governmental institutions which were nominated by the established legal framework as competent and accountable for the execution of the obligations under the Stockholm Convention, the public sector, the non-governmental sector and the public</li> <li>2. Comprehensive information on the Convention and environmental aspects, as well as data related to the monitoring results, human and environmental exposure and activities to reduce the production and emission of PCDD/PCDF made available to the public, through an adequate infrastructure for information management</li> </ol>

The priorities for POPs management in BiH are covered in the NIP action plans, which specify the measures and activities that need to be implemented in order to ensure the implementation of the Stockholm Convention in BiH, the institutions responsible for their realization, as well as the time frame and the estimated necessary funds.

The conditions for the successful execution of the NIP and the realization of the priorities and objectives are as follows:

- Ensuring an institutional/organizational framework for the execution of the NIP;
- Ensuring the required financial and human resources from the authorities in BiH and international donors;

- Availability of international support;
- Commitment of all stakeholders involved in the implementation process of the NIP.

The first and most important step in the implementation of the NIP is to ensure an institutional/organizational framework i.e. a coordination mechanism for NIP implementation. In addition to establishing coordination mechanism between existing institutions and powers granted to them, it also necessitates determining the institutions responsible for the implementation of specific activities from the action plans and strategies, and ensuring proper coordination among these institutions. The institutions responsible for carrying out certain activities at BiH, FBiH, RS and BD levels, as well as the key stakeholders are identified in action plans.

Considering the fact that BiH is a country in transition, undergoing economic development, the successful implementation of the NIP will depend on the possibilities of financing and the support of international partners. Even though the government institutions at BiH, FBiH, RS and BD levels play a crucial role in the efficient management of POPs, the technical and financial assistance provided by international organizations and institutions of other developed countries will also be needed due to the assumed costs of disposal of equipment containing PCBs, remediation of contaminated sites and other costs required for the implementation of the Stockholm Convention.

In order to ensure implementation of the NIP and minimize the possibility of derogations from measures and activities envisaged in the action plans, the identified competent institutions should be actively involved in the fulfilment of the planned activities.

### 3.2.2 ORGANIZATIONAL FRAMEWORK FOR NIP IMPLEMENTATION

Article 9, Paragraph 3 of the Stockholm Convention, stipulates that each Party is obligated to designate a national focal point for communication and exchange of information through the Convention Secretariat relevant to:

- i. the reduction or elimination of the production, use and release of POPs;
- ii. alternatives to POPs, including information relating to their risks as well as to their economic and social costs.

In accordance with the conclusions adopted by the Council of Ministers of BiH “ *On Establishment of Institutional and Organizational Infrastructure in BiH for Environment and GEF Programmes Management*” at the 66<sup>th</sup> Session of the Council of Ministers held on 16 May 2002, the Ministry of Foreign Trade and Economic Relations of BiH was nominated as focal point for coordinating the cooperation with international organizations and authorities of the Stockholm Convention.

According to Article 9 of the *Law on Ministries and Other Government Authorities of BiH*<sup>153</sup>, the Ministry of Foreign Trade and Economic Relations of BiH is responsible for the tasks within the jurisdiction of BiH pertaining to defining policy, basic principles, coordinating activities and harmonizing plans of the Entity authorities and institutions at the international level in the field of agriculture, energy, environmental protection, development and use of resources, tourism.

Institutions responsible for implementation of the Convention in BiH are:

- Ministry of Foreign Trade and Economic Relations of BiH;
- In FBiH: Federal Ministry of Environment and Tourism;
- In RS: Ministry of Physical Planning, Civil Engineering and Ecology of RS;
- In BD: Department for Spatial Planning and Property Affairs of the Brčko District Government

However, since certain obligations arising from the provisions of the Convention are within the jurisdiction of other state and entity authorities, all institutions in BiH, FBiH, RS and BD, as well as other key players responsible for the implementation of activities proposed in the NIP, are identified in action plans. In the Entities, the coordination of activities carried out by the mentioned bodies, industry and other participants is carried out by the Federal Ministry of Environment and Tourism, the Ministry of Physical Planning, Civil Engineering and Ecology of RS and the Department of Spatial Planning and Property Affairs of Brčko District Government, within their jurisdictions. Coordination of all activities carried out by state institutions/organizations, entities and BD is carried out by the Ministry of Foreign Trade and Economic Relations of BiH.

<sup>153</sup> Official Gazette of BiH, no. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103/09

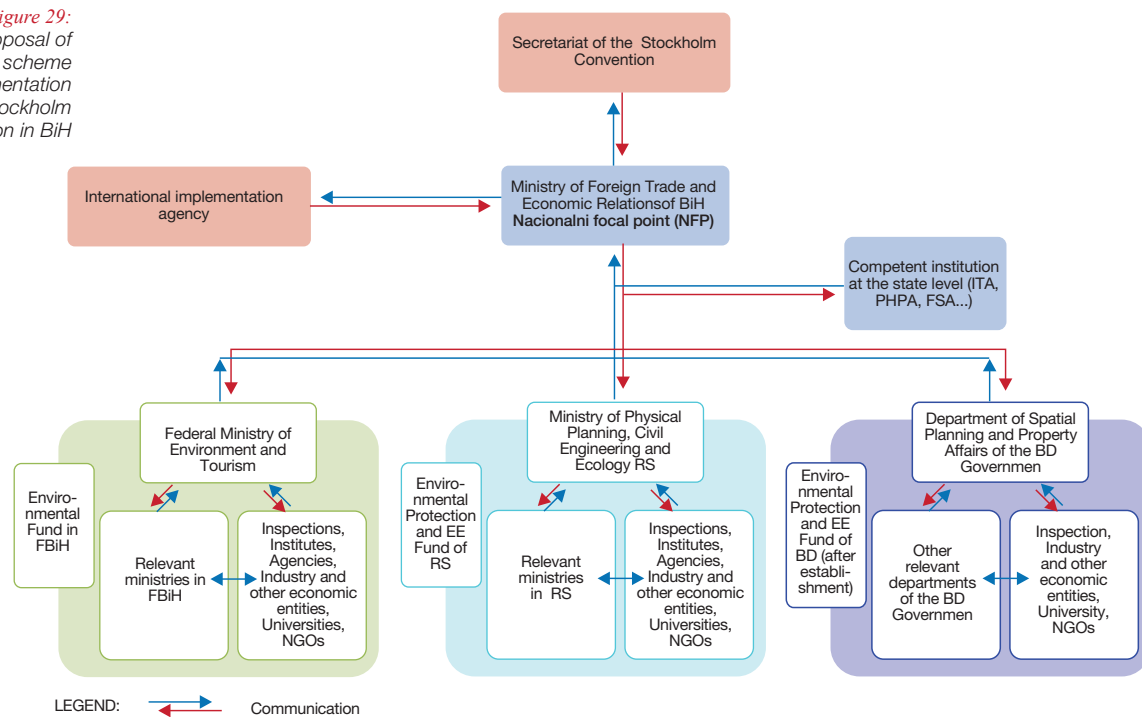
In order to ensure the implementation of the Stockholm Convention through synergy with the Rotterdam and Basel Convention, and the successful implementation of the NIP, in the short term it is necessary to establish an effective and reliable mechanism of coordination between the Ministry of Foreign Trade and Economic Relations of BiH, as the focal point for the coordination of cooperation with international structures and organs of the Stockholm Convention, and the institutions responsible for the implementation of the Convention in the Entities (FMET, MPPCEE and DSPPA). This coordination mechanism will contribute to the obligation of the entities to provide all necessary assistance to the Council of Ministers of BiH in order to enable BiH to fulfil international obligations<sup>154</sup> defined by the Stockholm Convention.

The coordination mechanism needs to define the following aspects:

- Establishment of a reporting system in BiH regarding the implementation of the Stockholm Convention (the procedure of reporting to National Focal Point);
- The method of collection, integration, processing and exchange of information on POPs in BiH;
- Monitoring of implementation of activities defined in the NIP;
- Coordination of mechanisms of technical and financial assistance to the competent authorities in BiH, FBiH, RS and BD;
- Participation in meetings, conferences and workshops organized by the Secretariat and other bodies of the Convention

Figure 29 presents the proposal of organizational scheme for the implementation of the Stockholm Convention in BiH.

*Figure 29:  
Proposal of  
organizational scheme  
for the implementation  
of the Stockholm  
Convention in BiH*



The Ministry of Foreign Trade and Economic Relations of BiH:

- Collaborates and communicates with the Secretariat of the Convention;
- Coordinates the implementation of all activities defined in the NIP;
- Coordinates the activities in the responsibility of state institutions/organizations; entities and BD;
- Checks and analyzes data submitted by the institutions responsible for the implementation of the Stockholm Convention in FBiH, RS and BD and prepares comprehensive periodic reports as required by the Convention;

<sup>154</sup> In accordance with Article 3, paragraph 2b) of the Constitution of Bosnia and Herzegovina

- Submits periodic reports, in accordance with the provisions of the Convention and in the format specified for reporting, to the Secretariat of the Stockholm Convention;
- Coordinates the needs for technical and financial assistance available through the mechanisms of the Stockholm Convention and international development organizations;
- Represents BiH in meetings, conferences and workshops organized by the Secretariat and other bodies as well as NGOs.

Institutions responsible for the implementation of the Stockholm Convention in FBiH, RS and BD:

- Carry out activities provided in the NIP in FBiH, RS and BD within their jurisdictions;
- Implement and monitor the implementation of activities defined by the NIP;
- Collect all the relevant information required by the Convention from the responsible entity ministries (and departments of the BD Government), institutes and agencies, process them and submit to the National Focal Point, in line with the *Procedure on Reporting of POPs to the National Focal Point* whose adoption is planned this document;
- Regularly update database on POPs;
- Finance activities envisaged by the NIP with the help of the Governments and other relevant ministries, and environmental funds;
- In collaboration with MoFTER apply to various international adequate funds available for the implementation of activities envisaged by the NIP.

## 3.3 ACTIVITIES, STRATEGIES AND ACTION PLANS

### 3.3.1 ACTION PLAN: INSTITUTIONAL AND REGULATORY STRENGTHENING MEASURES

Due to the complex administrative structure of BiH, the legislative acts relating to the management of the environment and chemicals are adopted at entity and Brcko District level, even though legislation at the state level also contains provisions relating to POPs listed in Annex A and Annex B of the Convention. The situation is even more complex in the Federation of BiH, due to the fact that normative acts are adopted at the cantonal level as well. In terms of laws, the legal framework complies with the environmental standards of the EU; however, the absence of certain bylaws was noted during the development of the preliminary inventory of POPs. In RS, the *Law on Biocides* and the *Law on Chemicals* have been in force since 2009, and a large number of bylaws were adopted based on these laws in the period 2010-2013. In FBiH, old laws on management of chemicals, taken over from former Yugoslavia, are still in force, and the draft Law on Chemicals, Law on Biocides and Law on Transport of Hazardous Materials are still in parliamentary procedure. Brcko District has still not adopted any legislation that regulates the management of chemicals. As a result of the aforementioned, there is a significant disproportion in the number and types of adopted laws and bylaws in the field of environmental protection and management of chemicals, with regard to the competences of BiH, the entities and Brcko District.

Such a complex legal framework has resulted in a complex institutional framework at all levels. The responsibility for the implementation of the Stockholm Convention, and the management, control and monitoring of POPs chemicals is divided among more than 10 institutions at state, entity and BD level, as defined by the constitutions and regulations in force. The environmental administration at all administrative levels in BiH has legally defined mandates governing their responsibilities and functions. The obligations of BiH with regard to environmental issues arising from international treaties and conventions fall under the jurisdiction of the Council of Ministers and the Ministry of Foreign Trade and Economic Relations (MoFTER) in accordance with the *Law on Ministries and Other Bodies of Administration of Bosnia and Herzegovina*. Despite this, during the analysis of the institutional framework for POPs management in BiH, gaps, overlaps and duplications of responsibilities and functions have been identified, as well as a lack of definition of specific competencies (for e.g., no

institution for systematic monitoring of the content and levels of POPs in the biome has been appointed, and consequently, there are no results of systematic monitoring). It should be noted that identified issues in the legal and institutional framework may be addressed without requiring almost any financial resources. All these shortcomings occur due to the low level of awareness about the adverse impacts of POPs, but also due to the absence of a vibrant civil society that could, if adequately informed and motivated, significantly affect the holders of legislative and executive powers to overcome the identified problems.

Given that in FBiH the Law on Chemicals and the Law on Biocides are still in parliamentary procedure, it is necessary to speed up their adoption. These draft laws are identical to already existing laws which were passed in RS in 2009. The adoption of these laws in FBiH, and the adoption of identical laws in BD will significantly ease and harmonise the procedure of managing chemicals and biocides in Entities and thereby contribute to the effective application of modern regulations which also relate to POPs.

### 3.3.1.1 Objectives of institutional and regulatory strengthening

The main objective of this Action Plan is to develop adequate institutional capacities and harmonized legislation for each segment of POPs management in accordance with the provisions of the Stockholm Convention and the EU acquis.

Improving, i.e. creating an adequate legal framework relating to all aspects of managing POPs chemicals listed under the Stockholm Convention, and aspects of environmental protection (including hazardous waste management) was ranked by the stakeholders as the highest priority. In order to improve or create such a framework, the competent authorities need to adopt/amend the legal framework in BiH, FBiH, RS and BD to adapt it to the requirements of the Convention and EU legislation.

Table 165 provides an overview of the main and specific objectives for institutional and regulatory strengthening measures which need to be achieved in order to ensure the full implementation of the Stockholm Convention in BiH.

*Table 165:  
Main and specific  
objectives of institutional  
and regulatory  
strengthening measures*

Institutional and regulatory strengthening measures - Main and Specific Objectives
<p><b>Main Objective 1. Improving or creating an adequate legal framework relating to all aspects of managing POPs chemicals which are listed under the Stockholm Convention and aspects of environmental protection (including hazardous wastes)</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Legislation that ensures the fulfilment of all obligations under the Stockholm Convention, drafted/amended/ revised and adopted at BiH, FBiH, RS and BD levels</li> <li>2. Laws and bylaws related to the monitoring of chemicals that are listed under the Stockholm Convention are harmonized with EU Regulations, which necessitates amending the bylaws regulating the emission limit values and levels of impact</li> </ol>
<p><b>Main Objective 2. Establishing a mechanism for the coordination and enhancing the institutional framework for the implementation of the Stockholm Convention as well as allocating responsibilities for all aspects of POPs management in the existing institutional framework</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Established coordination mechanism for carrying out obligations of BiH undertaken by ratifying the Stockholm Convention and reporting to the Convention Secretariat</li> <li>2. Established comprehensive systems/mechanisms for managing chemicals in BiH, FBiH, RS and BD</li> <li>3. Strengthening capacities for amendment and an effective implementation of the adopted legislation through training and educating relevant staff</li> <li>4. Additionally trained and enhanced inspectional supervision</li> </ol>
<p><b>Main Objective 3. Introducing economic measures for environmental protection and the implementation of the Stockholm Convention</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Introduced environmental fees</li> <li>2. Introduced penalties for non-compliance with regulations on the emissions of pollutants</li> </ol>
<p><b>Main Objective 4. Establishing criteria and mechanisms for the customs control of import, export and transit of equipment and products that potentially contain POPs</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Strengthened mechanism for controlling import of equipment and products that potentially POPs</li> </ol>

### 3.3.1.2 Planned activities and measures for institutional and regulatory strengthening

The planned activities and measures of the Action Plan are aimed at developing an adequate legal and institutional framework for the management of POPs chemicals in BiH.



**Main Objective 1: Improving or creating an adequate legal framework relating to all aspects of managing POPs chemicals which are listed under the Stockholm Convention and aspects of environmental protection (including hazardous wastes)**

One of the key measures in this regard is the drafting and adoption of a specific Law on Persistent Organic Pollutants at entity and BD level, which would regulate in detail all the requirements set out in the Stockholm Convention, and constitute a *lex specialis* law in relation to other regulations that govern the issues of chemicals, biocides, waste management, etc. The adoption of such a specific law would help ensure the fulfilment of obligations assumed by BiH under the Convention, and could be a more effective instrument for creating an adequate legal framework than amending a wide range of laws and by-laws.

Amendments to the legislation refer to all aspects of POPs management, including the development of detailed inventories, introduction of new technologies, techniques and practices, development of programs for monitoring of POPs chemicals in the environment and their impacts on human health. In order to monitor the level of pollution generated by unintentionally produced POPs and the amounts of emissions, and influence the reduction (and elimination) of emissions, it is necessary for the responsible institutions of FBiH, RS and BD to define, through laws and bylaws, the limit values for POPs chemicals in the environment, the methods of monitoring the emissions and the application of BATs, as well as the penalties for violators of prescribed measures. The competent ministries in FBiH, RS and BD need to amend the normative acts and draft appropriate bylaws which would regulate in detail the activities related to all aspects of implementation and enforcement of the Stockholm Convention, including amending the existing regulations or adopting new regulations related to monitoring the concentrations of POPs in the environment, monitoring of PCBs in the environment, PCB management, disposal of PCB containing equipment and waste, prohibition of use (of PBDEs) or limiting the use of (PFOS), and monitoring the concentrations of PCDD/PCDF in the environment, in line with the provisions of the Stockholm Convention.

**Main Objective 2: Establishing a mechanism for the coordination and enhancing the institutional framework for the implementation of the Stockholm Convention as well as allocating responsibilities for all aspects of POPs management in the existing institutional framework**

Institutional strengthening measures include the establishment of an effective and reliable mechanism of coordination between MoFTER, as the focal point for the coordination of cooperation with international structures and organs of the Stockholm Convention, and the institutions responsible for the implementation of the Convention in the Entities (FMET, MPPCEE and DSPPA). With the establishment of such a coordination mechanism, MoFTER would have a coordinating role in fulfilling the obligations of BiH assumed by the ratification of the Stockholm Convention, and the duties of reporting to the Secretariat of the Convention (obligation under Article 15 of the Convention) on measures undertaken for the purposes of implementing the Convention and the effects of such measures in meeting the objectives set out by the Convention, whereas FMET, MPPCEE and DSPPA would have the role of implementers of the Convention in the entities/District. The main role of such a coordination mechanism is ensuring the implementation of the Stockholm Convention through synergy with the Rotterdam and Basel Convention, as well as monitoring and controlling the import/export, use and management of POPs chemicals and the management of hazardous wastes containing POPs in accordance with the principles of the aforementioned Conventions.

Furthermore, the planned measures include measures to strengthen institutional capacities: in addition to administrative bodies, particularly the inspection authorities, it is necessary to provide appropriate training to judicial authorities as well, in order to familiarize the prosecutor's offices and the courts with the principles and objectives of the Stockholm Convention, and the importance of reducing the use of POPs and generation of unintentionally produced POPs.

**Main Objective 3: Introducing economic measures for environmental protection and the implementation of the Stockholm Convention**

The mobilization of financial resources is of crucial importance for the sustainability and implementation of the Stockholm Convention. The competent institutions in FBiH, RS and BD should ensure the implementation of the "polluter pays" principle; the principles of precaution and prevention, and the principle of replacement – any activity which may have a detrimental effect on the environment should be replaced by another which represents a lower risk. In order to achieve this, the competent institutions in FBiH, RS and BD can reduce the impact of

pollutants on the environment and promote the “polluter pays” and the “user pays” principles with the help of regulatory and fiscal measures. This mostly refers to the introduction of fees paid by those who use natural resources and pollute the environment.

In BiH, the funds for financing activities in the field of environmental protection are provided from various fees. In the Federation of BiH, the *Law on Environmental Fund of FBiH* (Official Gazette of FBiH, no. 33/03) defines fees paid by air polluters, special environmental fees paid during motor vehicle registration, fees under the *Law on Waste Management* (fees for managing packaging and packaging waste, fees for managing waste from electronic and electrical products, fees for plastic bags) and fees under the *Law on Waters*. In Republika Srpska, the *Law on the Fund and Financing of Environmental Protection of RS* (Official Gazette of RS, no. 117/11) defines fees for environmental burden caused by waste and water protection fees paid by owners of vehicles using oil or oil derivatives in accordance with the *Law on Waters*, fees for managing packaging waste and feed raised under the *Law on Renewable Energy Sources and Efficient Cogeneration* (Official Gazette of RS, no. 39/13). Brcko District has not yet established its own Environmental Protection Fund. One of the priorities stated in the Environmental Strategy of the Brcko District 2013 - 2023 (in the process of public debate) is the establishment of the Environmental Protection Fund whose funds will be used for financing programs, projects and activities in the field of conservation, sustainable use, protection and improvement of the state of the environment.

Bearing in mind that economic instruments are the best way to integrate economic and environmental aspects of economic development, the Entity funds for environmental protection will need to introduce appropriate economic instruments that will stimulate the application of BAT/BEP. In the implementation of economic instruments, it is particularly important to precisely define the objectives, to involve all stakeholders and to analyze the effects of economic instruments on the economy.

According to the principles of the Stockholm Convention (Article 13) and EU policy, which encourages the use of economic tools as the best method for integrating economic and environmental development, it is necessary for the competent institutions in FBiH, RS and BD to consider introducing the following fees:

- Fees for managing waste from electronic and electrical products;
- Fee for managing ELVs;
- Fee for unintentional releases of POPs into the environment (Annex C), which would be paid by industrial facilities identified as a potential source in the preliminary inventory.

The environmental fees collected through the environmental protection funds of FBiH and RS can be used for the rehabilitation of endangered areas as well as for exposure monitoring.

In order to ensure compliance with regulations on emissions of pollutants, the Entity ministries and departments in the BD Government responsible for the environment, need to prescribe penalties for non-compliance with regulations on the emissions of pollutants.

#### **Main Objective 4: Establishing criteria and mechanisms for the customs control of import, export and transit of equipment and products that potentially contain POPs**

According to Article 3 of the Convention, within ITA – Customs Sector it is necessary to strengthen the capacities of inspections in order to prevent the import of goods containing substances from the list of the Stockholm Convention.

Specific Objective 4.1: Strengthened mechanism for controlling import of equipment and products that potentially POPs

##### *Amendment to the Customs Tariff of BiH*

In accordance with the provisions of the Law on Customs Tariff (“Official Gazette of BiH”, no. 58/12), the Ministry of Foreign Trade and Economic Relations of BiH should, based on consultations with Indirect Taxation Authority of BiH, prepare a proposal for amendments to the Customs Tariff, so that:

- Each POPs pesticide listed under Annex A to the Convention has its own tariff heading. The current Customs Tariff of BiH recognizes the following tariff headings:
  - 2903 82 00 00 - aldrin, heptachlor, chlordane

- 2903 92 00 00 - hexachlorobenzene, DDT
- 2910 40 00 00 – dieldrin
- 2913 90 00 00 – endrin
- 2903 89 90 00 – mirex
- 3808 50 00 00 - toxaphene (goods specified in footnote of subheading no. 1 of this heading)
- 3808 91 20 00 - insecticides based on chlorinated hydrocarbons
- Equipment containing PCBs (transformers and capacitors containing PCBs) get a special heading for the purpose of enhancing control and surveillance of imports of equipment and devices that may contain PCBs. The existing customs tariff recognizes only “Waste oils containing PCBs, PCTs or PBBs (polybrominated biphenyls) – tariff heading no. 2710 91 00 00” and “Mixtures and preparations containing PCBs, PCTs or PBBs – tariff heading no. 3824 82 00 00”;
- Second-hand EEE which was produced before 01 July 2006 is assigned a specific tariff heading in order to facilitate monitoring and recording of equipment that may contain PBDEs;
- AFFF fire-fighting foam and aviation hydraulic oils get a special tariff heading for the purpose of enhancing control and surveillance of imports of equipment and devices that may contain PFOS. The existing customs tariff recognizes only “mechanical appliances for projecting, dispersing or spraying liquids or powders, fire extinguishers with a filling, spray guns and similar appliances; steam or sand blasting machines and similar machines” (heading no. 8424, i.e. 8424 10 00 00) and “hydraulic brake fluids and other prepared liquids for hydraulic transmission, not containing or containing less than 70 % by weight of petroleum oils or oils obtained from bituminous minerals” (heading no. 3819 00 00 00).

The proposed Customs Tariff is adopted by the Council of Ministers of BiH.

*Strengthening the capacity of the Indirect Taxation Authority of BiH for controlling illegal import/export of equipment and products that potentially contain POPs*

The Indirect Taxation Authority of BiH should strengthen the capacity of the Customs Sector in order to control the illegal import/export of equipment and products that potentially contain POPs. This activity requires the Indirect Taxation Authority of BiH to:

- Prepare and implement a training program for customs officers on illegal import/export of POPs pesticides, in cooperation with the Ministry of Foreign Trade and Economic Relations of BiH, the Plant Health Protection Administration of BiH and other competent institutions in BiH, FBiH, RS and BD;
- Prepare and implement a training program for customs officers on illegal import/export of equipment and products that contain PCBs, in collaboration with the Ministry of Foreign Trade and Economic Relations of BiH and other relevant institutions in BiH, FBiH, RS and BD;
- Implement training of customs officers on products that potentially contain PBDEs in order to prevent illegal imports of second-hand EEE and vehicles, in collaboration with other relevant ministries in FBiH, RS and BD, with the recruitment of experts whose mobilization should be provided by MoFTER through applications for technical assistance to the Secretariat of the Stockholm Convention or through other international financial organizations. PBDEs have not been manufactured in Europe since 1997, whereas the United States ceased production in 2004<sup>155</sup> therefore the reasonable assumption is that illegal import of PBDEs to BiH can only be in old EEE and used vehicles;
- Strengthen the capacity of the Customs Sector in compliance with the *Regulation on Restrictions, Ban and Manufacture Conditions, Trade and Use of Chemicals* through training of staff of customs officers in coordination with MoFTER. Training should include information about possible applications of PFOS in products, the largest manufacturers of PFOS substances (China)<sup>156</sup> and the recording of “problematic” products.

<sup>155</sup> Guidance on best available techniques and best environmental practices for the recycling and disposal of articles containing polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants (UNIDO, 2012)

<sup>156</sup> “Perfluorooctane Sulfonate (PFOS) Production and Use: Past and Current Evidence” (UNIDO, 2009)

Action plan for institutional and regulatory strengthening (Table 166) includes the planned measures and activities that need to be implemented for the successful implementation of all obligations under the Stockholm Convention in BiH, identifies institutions responsible for their implementation, as well as the time frame and the estimated necessary funds.

*Table 166:  
Action Plan 3.3.1:  
Institutional and  
regulatory strengthening  
measures*

Action Plan 3.3.1: Institutional and regulatory strengthening measures		
Objectives	Activities	Time frame
<b>Main Objective 1. Improving or creating an adequate legal framework relating to all aspects of managing POPs chemicals which are listed under the Stockholm Convention and aspects of environmental protection (including hazardous wastes)</b>		
<b>Specific Objective 1.1.</b> Legislation that ensures the fulfilment of all obligations under the Stockholm Convention, drafted/amended/ revised and adopted at BiH, FBiH, RS and BD levels	<b>Activity 1.1.1</b> Pass a <i>lex specialis</i> Law on POPs at FBiH, BD and RS level to regulate in detail the entire lifecycle of all chemicals mentioned in the Stockholm Convention	Until 01 June 2015
	<b>Activity 1.1.2</b> Insert/update/amend provisions on POPs in the relevant legal regulations in FBiH, RS and BD (Law on Environment, Law on Waste Management, Law on Air Protection,...)	Until 01 June 2015
	<b>Activity 1.1.3</b> Adopt law on chemicals and biocides in FBiH and BD: revise the draft of the FBiH Law on Chemicals to harmonize it with the provisions of the Stockholm Convention and accelerate its passing, and prepare and adopt the Law on Chemicals in BD	2015
	<b>Activity 1.1.4</b> Pass relevant bylaws in accordance with Regulation (EC) 1907/2006 ("REACH")	2016
	<b>Activity 1.1.5</b> Pass a Regulation on Terms to Limit and Ban Production, Circulation and Use of Chemicals, to include chemicals listed in the Stockholm Convention, and align it with Commission's Regulation (EC) No. 757/2010 on POPs, amending Regulation No. 850/2004	2016
	<b>Activity 1.1.6</b> Adopt all EU standards and recommended procedures to measure POPs in environment and food	Until 01 June 2015
	<b>Activity 1.1.7</b> Development of other specific by-laws (regulations, guidelines, etc.) is identified within individual Action Plans	
<b>Specific Objective 1.2.</b> Laws and bylaws related to the monitoring of chemicals that are listed under the Stockholm Convention are harmonized with EU Regulations, which necessitates amending the bylaws regulating the emission limit values and levels of impact	<b>Activity 1.2.1</b> Adopt the missing and update the existing legal documents in FBiH, RS and BD related to POPs, in accordance with the Stockholm Convention and EU regulations	
	<b>Activity 1.2.2</b> Appoint specific institutions for the implementation of the Stockholm Convention, laboratories for sampling and analysis and inspection bodies through relevant laws at FBiH, RS and BD level	Until 01 June 2015
<b>Main Objective 2. Establishing a mechanism for the coordination and enhancing the institutional framework for the implementation of the Stockholm Convention as well as allocating responsibilities for all aspects of POPs management in the existing institutional frameworks</b>		
<b>Specific Objective 2.1.</b> Established coordination mechanism for carrying out obligations of BiH undertaken by ratifying the Stockholm Convention and reporting to the Convention Secretariat	<b>Activity 2.1.1</b> Establish an effective and reliable coordination mechanism between MOFTER and institutions responsible for Stockholm Convention in the entities and BD (FMET, MPPCEE and DSPPA) with clearly defined obligations and responsibilities for the implementation of the Convention	2015 (establishment)
	<b>Activity 2.1.2</b> Appoint persons/units responsible for the implementation of the Stockholm Convention in the institutions	2015
<b>Specific Objective 2.2.</b> Established comprehensive systems/mechanisms for managing chemicals in BiH, FBiH, RS and BD	<b>Activity 2.2.1</b> Appoint relevant bodies to monitor the implementation of the Stockholm Convention (including emissions and imissions of unintentionally produced POPs) within the appropriate ministries at entity and BD level	Until end of March 2015
	<b>Activity 2.2.2</b> Nominate institution/s responsible for collection, sorting and further distribution of data on monitoring results, release of POPs into the environment and disposal of waste containing POPs, and collect, sort and make available the existing data	
	<b>Activity 2.2.3</b> Nominate institutions responsible for monitoring of biomes in entities and BD	

Competent institution/ organization	Stakeholders	Estimated financial resources
BiH: FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments in BD Government; Business entities that handle POPs	Regular activities within the budget FBiH: 10,000 BAM RS: 10,000 BAM BD: 10,000 BAM
Competent ministries of health and environmental protection in the entities and BD	Other competent state and entity ministries and departments in BD Government; Business entities that produce or handle POPs	Regular activities within the budget
BiH: - FBiH: FMH RS:- BD: DHOS	Other competent state and entity ministries and departments in BD Government	Regular activities within the budget FBiH: 5,000 BAM BD: 10,000 BAM
BiH: - FBiH: FMH in cooperation with FMET RS:- BD:BD Government	Other competent state and entity ministries and departments in BD Government	Regular activities within the budget FBiH: 20,000 BAM BD: 20,000 BAM
BiH: - FBiH: FMH RS:- BD: BD Government	Other competent state and entity ministries and departments in BD Government	Regular activities within the budget FBiH: 5,000 BAM BD: 5,000 BAM
Competent ministries of environmental protection and health in the entities and BD	-	Regular activities within the budget

*Development of other specific by-laws (regulations, guidelines, etc.) is identified within Action Plan 3.3.9: Measures for reducing releases from unintentional production and Action Plan 3.3.18. Research, development and monitoring*

Competent ministries of environmental protection and health in the entities and BD	Potential institutions for the implementation of the Convention, laboratories for sampling and analysis, inspection bodies and commercial entities that produce or possess POPs	Regular activities within the budget FBiH: 10,000 BAM RS: 10,000 BAM BD: 10,000 BAM
BiH: MoFTER in cooperation with: FBiH: FMET RS: MPPCEE BD: DSPPA	MCA, PHPA, entity ministries and departments of the BD Government in charge of health care, energy, mining and industry, and agriculture, water management and forestry	Regular activities within the budget BiH: 10,000 BAM FBiH: 8,000 BAM RS: 8,000 BAM BD: 5,000 BAM
BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	MCA, PHPA, Other competent state and entity ministries and departments in BD Government; Institutes; Agencies	Regular activities within the budget
BiH: MoFTER FBiH: FMET RS: MPPCEE BD: DSPPA	-	Regular activities within the budget

*This activity is described in detail in the context of Activities 1.4.2 of the Action Plan 3.3.18. Research, development and monitoring*

*This activity is described in detail in the context of Activities 1.1.2 of the Action Plan 3.3.18. Research, development and monitoring*

Action Plan 3.3.1: Institutional and regulatory strengthening measures		
Objectives	Activities	Time frame
Specific Objective 2.3. Strengthening capacities for amendment and an effective implementation of the adopted legislation through training and educating relevant staff	<b>Activity 2.3.1</b> Appoint bodies at BiH, entity and BD level responsible for continued development, specialization and sub-specialization through university faculties and institutions appointed to control POPs	From 01 June 2015 onwards
	<b>Activity 2.3.2</b> Prepare and implement a <b>detailed plan of training and education</b> about the impact of POPs chemicals (including inspection and customs staff) in bodies responsible for management of POPs chemicals and waste containing POPs, which will define specific programs for education and capacity building of staff, including but not limited to: i. thematic areas of training (POPs groups, BAT/BEP, waste management) ii. types and dynamics of programs for various institutions/organizations iii. guidance on education and training iv. guidance on the preparation of materials v. number of programs to be organized vi. the expected results of the of programs	
Specific Objective 2.4. Additionally trained and enhanced inspectional supervision	<b>Activity 2.4.1</b> Organize training programs for inspection bodies in accordance with the detailed plan for training and education	
<b>Main Objective 3. Introducing economic measures for environmental protection and the implementation of the Stockholm Convention</b>		
Specific Objective 3.1. Introduced environmental fees	<b>Activity 3.1.1</b> In BD, establish an Environmental Protection Fund, in accordance with the Strategy of Environmental Protection of BD for the period 2013 - 2023 (draft at a public hearing)	2015 (taken from the Draft Strategy of Environmental Protection of BD for the period 2013 - 2023)
	<b>Activity 3.1.2</b> In RS and BD (after the implementation of Activity 3.1.1. and after the adoption of regulations governing management of waste from electrical and electronic equipment (EEE) in accordance with <i>Activity 1.1.3. Action Plan 3.3.5.</i> ) introduce a fee for the waste management of electronic and electrical products modelled after the system in FBiH	2017
	<b>Activity 3.1.3</b> Introduce a fee for ELV management	2017
	<b>Activity 3.1.4</b> Introduce compensation for accidental releases of POPs into the environment (Annex C), which would be paid by industries identified as a potential source in the preliminary inventory	2017
Specific Objective 3.2. Introduced penalties for non-compliance with regulations on the emissions of pollutants	<b>Activity 3.2.1</b> Prescribe fines for non-compliance with regulations on the emissions of pollutants	2016
<b>Main Objective 4. Establishing criteria and mechanisms for the customs control of import, export and transit of equipment and products that potentially contain POPs</b>		
Specific Objective 4.1. Strengthened mechanism for controlling import of equipment and products that potentially POPs	<b>Activity 4.1.1</b> Amendment to the Customs Tariff relating to: ▪ POPs pesticides ▪ Equipment with PCBs (transformers and capacitors containing PCBs) ▪ Electrical and electronic equipment produced before 01 July 2006 ▪ Fire-fighting AFFF foam, hydraulic oils for civil aviation	2015
	<b>Activity 4.1.2</b> Organize training program of the Indirect Taxation Authority (Customs Sector) for: ▪ control of illegal import of POPs pesticides ▪ control of illegal imports of products and equipment containing PCBs ▪ control of import / export of used cars and furniture and EEO (related to Activity 2.2.3 of the Action Plan 3.3.5) ▪ control of illegal import / export of equipment that may contain PBDEs ▪ control of illegal import / export of PFOS	2016-2020
	<b>Activity 4.1.3</b> Enhance control at border crossings to prevent illegal import of POPs	2016 onwards
Expected commencement of implementation of the action plan		
Duration of the implementation of the action plan		
Total estimated required financial resources		

Competent institution/ organization	Stakeholders	Estimated financial resources
Authorities appointed for the implementation of the Convention	Faculties and appointed institutions for controlling POPs	Regular activities within the budget

Activities relating to the training are specified within individual action plans for specific segments of POPs management

Activities relating to the organization of trainings related to specific segments of POPs management are specified within individual action plans

BiH:- FBiH:- RS:- BD: BD Government	BD Government	200,000 KM (taken from the Draft Strategy of Environmental Protection of BD for the period 2013 - 2023)
BiH: FBiH: RS: Environmental Protection and Energy Efficiency Fund of RS BD: Environmental Protection Fund of BD (after establishment)	FMET, MPPCEE, BD Government	Regular activities within the budget
BiH: FBiH: Environmental Fund of FBiH RS: Environmental Protection and Energy Efficiency Fund of RS BD: Environmental Protection Fund of BD (after establishment)	FMET, MPPCEE, BD Government	Regular activities within the budget
BiH: FBiH: Environmental Fund of FBiH RS: Environmental Protection and Energy Efficiency Fund of RS BD: Environmental Protection Fund of BD (after establishment)	FMET, MPPCEE, BD Government	Regular activities within the budget
BiH: FBiH: FMET RS: MPPCEE BD: DSPPA	Inspectorates in FBiH, RS i BD	Regular activities within the budget

BiH: MoFTER in consultation with ITA FBiH: - RS: - BD: -		Regular activities within the budget BiH: 10,000 BAM
BiH: ITA FBiH: - RS: - BD: -	MoFTER; PHPA; entity ministries and departments of the BD Government in charge of environment, agriculture, water management and forestry; Importers of second-hand EEE and vehicles	BiH: 80,000 BAM Funds needed for organization of trainings, workshops, meetings, and engagement of expert consultants Funds may be provided from the budget of BiH or from international sources / funds (through grants, projects, etc.)
BiH: ITA FBiH: - RS: - BD: -		Regular activities within the budget

Upon the adoption of the NIP

2015-2020

246,000 BAM \*  
BiH: 100,000 BAM, FBiH: 58,000 BAM, RS: 28,000 BAM, BD: 60,000 BAM

### 3.3.2 ACTION PLAN: MEASURES TO REDUCE OR ELIMINATE RELEASES FROM INTENTIONAL PRODUCTION AND USE

This action plan was not elaborated separately, as it is contained in the following action plans:

- Action Plan 3.3.3: Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)
- Action Plan 3.3.4: Production, import and export, use, identification, labelling, removal, storage and disposal of polychlorinated biphenyls (PCBs) and equipment containing PCBs (Annex A, Part II)
- Action Plan 3.3.5: Production, import and export, use, stockpiles and wastes of hexaBDE and heptaBDE (Annex A, Part IV) and tetraBDE and pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I) and
- Action Plan 3.3.7: Production, import and export, use, stockpiles and wastes of PFOS, its salts and PFOSF (Annex B, Part III).

### 3.3.3 ACTION PLAN: PRODUCTION, IMPORT AND EXPORT, USE, STOCKPILES AND WASTES OF POPs PESTICIDES (ANNEX A, PART I)

#### 3.3.3.1 Objectives of management of POPs pesticides

The main objective of this Action Plan is to ensure an adequate framework for the management of POPs pesticides and waste of POPs pesticides in BiH, including the prevention of their future releases into the environment.

Table 167 provides an overview of the main and specific objectives for management of POPs pesticides which need to be achieved in order to ensure the implementation of the Stockholm Convention in BiH.

*Table 167:  
Main and specific  
objectives of POPs  
pesticides management*

Management of POPs pesticides (Annex A, Part I) – Main and specific objectives
<b>Main Objective 1. Improving the institutional framework for the management of POPs pesticides</b>
Specific objective: 1. Additionally trained and strengthened capacity of institutions and inspection
<b>Main Objective 2. Enhancing or creating an adequate legal framework related to all aspects of POPs pesticides management</b>
Specific objectives: 1. Legislation that ensures the fulfilment of all obligations under the Stockholm Convention related to management of POPs pesticides drafted/amended/reviced and adopted at BiH, FBiH, RS and BD levels 2. Laws and bylaws related to the monitoring of POPs pesticides are harmonized with EU Regulations, which necessitates amending the bylaws regulating the emission limit values and levels of impact
<b>Main Objective 3. Strengthening technical capacity for collecting, organizing, structuring and processing of data on pesticides</b>
Specific objectives: 1. Established a system for identifying, recording and storing data relating to the import of plant protection products (using phyto-pharmaceutical means) at border crossings in BiH 2. Ensured system to create an inventory of data on pesticides formulated or repackaged in BiH
<b>Main Objective 4. Ensuring an adequate waste management system for plant protection products</b>
Specific objective: 1. Ensured adequate disposal of empty packaging of POPs pesticides
<b>Main Objective 5. Strengthening the capacity for monitoring POPs pesticides in the environment and living organisms, including identification of waste and locations potentially contaminated with POPs</b>
Specific objectives: 1. Measurement of potential pesticide residues at critical locations (“hot-spots”) where POPs pesticides have been previously used 2. Control of the components of pesticide formulations
<b>Main objective 6. Raising awareness of target groups</b>
Specific objective: 1. Undertaken activities to educate and raise awareness of target groups



### 3.3.3.2 Planned activities and measures for management of POPs pesticides

With respect to the requirements of the Stockholm Convention relating to management of POPs pesticides, all Parties are obligated to:

- Prohibit and/or take all legal and administrative measures necessary to eliminate the production, use, import and export of POPs pesticides listed under Annex A to the Convention;
- Supervise/monitor the use of POPs pesticides for laboratory-scale research, and the presence of traces of pesticides in products and items;
- Restrict import and export of POPs pesticides, except under conditions outlined in Article 4 of the Convention (exceptions will be reported to the Secretariat of the Convention), or for purpose of environmentally sound disposal of POPs pesticides;
- Develop and implement strategies for identifying stockpiles, products and items in use and wastes containing POPs pesticides;
- Prohibit reuse, recycling, recovery, and direct or alternative use of POPs pesticides;
- Manage stockpiles in a safe, efficient and environmentally sound manner until they become waste;
- Take measures to ensure environmentally sound handling, transportation and storage of POPs pesticides and disposal of POPs pesticides. Waste needs to be disposed of in an environmentally sound manner, taking into account international regulations, standards and guidelines.

The requirements of the Stockholm Convention relating to DDT are the same as the ones relating to POPs pesticides specified in Annex A, including the following provisions:

- All Parties are obliged to cease the production and use of DDT, except for (as specified in Annex B - Part I):
  - Vector disease control according to the instructions of World Health Organisation
  - production and use of DDT as an intermediate in the production of dicofol
- All Parties are obligated to promote research and development of alternative chemicals to DDT.

For the successful implementation of all obligations under the Stockholm Convention in BiH, the Action Plan for management of POPs pesticides has identified specific measures and activities which need to be carried out in accordance with the defined priorities and objectives.

#### **Main Objective 1: Improving the institutional framework for the management of POPs pesticides**

Specific Objective 1.1 Additionally trained and strengthened capacity of institutions and inspection

For the fulfilment of the provisions of the Stockholm Convention regarding the control and monitoring of pesticides, it is necessary that the administrations for inspection affairs in FBiH and RS and Inspectorate of BD Government strengthen inspectional supervision of POPs pesticides and organize a training program in order to strengthen their capacity. In addition, the entity ministries responsible for agriculture and water management, and health care, as well as the relevant departments of BD Government should strengthen capacities in relation to the management of pesticides (including POPs pesticides) and the disposal of waste containing pesticides through organizing training programs in cooperation with entity ministries responsible for the environment and the Plant Health Protection Administration of BiH.

#### **Main Objective 2: Enhancing or creating an adequate legal framework related to all aspects of POPs pesticides management**

Specific Objective 2.1 Drafted, updated and harmonized laws and bylaws relating to the import and transport of pesticides

The preliminary inventory of POPs in BiH has shown that legislation relating to trade and monitoring of POPs pesticides is incomplete. Due to the fact that there is a significant disproportion in the number and types of adopted laws and bylaws between the FBiH, RS and BD in the field of environmental protection and management of chemicals in general, including the management of pesticides, it is necessary that the entity ministries (and

departments of BD Government) responsible for agriculture and water management in cooperation with entity ministries (and departments of BD Government) responsible for health care and the Plant Health Protection Administration of BiH, adapt, amend and harmonize the existing regulations governing the management of pesticides. The competent ministries in FBiH and RS, departments of BD Government and the Plant Health Protection Administration of BiH should implement the plan for drafting bylaws and amending existing legislation in order to build a system specifically for registration and specifically in the field of import of pesticides. It should be noted that in RS there is an established system and the procedures and documentation necessary for registration and import of biocides are defined.

In addition, the aforementioned competent institutions in BiH, FBiH, RS and departments of BD Government should improve the legal framework that regulates the necessary documentation which must be provided by the importer of pesticides when importing pesticides, in order to prevent the import of pesticides that may contain active substances which are not permitted, among which there may be POPs pesticides (including DDT).

Specific Objective 2.2 Laws and implementing legislation concerning monitoring of POPs pesticides harmonized with the relevant EU provisions

The competent institutions in FBiH, RS and departments of BD Government should amend existing or adopt new regulations related to monitoring concentrations of POPs pesticides in the environment, harmonize these laws with EU regulations and harmonize the legal framework between the entities by using the same principles.

This objective is treated in detail within *Action Plan 3.3.18: Research, development and monitoring*.

### **Main Objective 3: Strengthening technical capacity for collecting, organizing, structuring and processing of data on pesticides**

Specific Objective 3.1 Established a system for identifying, recording and storing data relating to the import of plant protection products (using phyto-pharmaceutical means) at border crossings in BiH

It is necessary that the entity ministries (and departments of BD Government) responsible for agriculture in cooperation with the Ministry of Civil Affairs of BiH, Plant Health Protection Administration of BiH, entity ministries responsible for agriculture, forestry and water management, and other relevant entity ministries (and departments of BD Government) establish a system for identifying, recording and storing data related to import of plant protection products (phytopharmaceutical agents) at border crossings of BiH, and establish a database of plant protection products (phytopharmaceutical agents). This would ensure a quick and simple way to determine which pesticides crossed the border of BiH at all times and allow for better control of imports of these chemicals and the ability to state with certainty that there were no illegal imports of POPs chemicals listed under the Stockholm Convention. This activity is related to implementation of activities which necessitate drafting the regulations that would regulate compulsory registration of imported plant protection products (phytopharmaceutical agents) at the border crossings of BiH.

The databases of plant protection products (phytopharmaceutical agents) need to be a part of existing registers of chemicals in FBiH, RS and BD, and need to be established or updated to contain all necessary information on the chemicals listed under the Stockholm<sup>157</sup>, for example:

- Common name
- Chemical name
- CAS number
- HS code chemical
- HS code mixture
- UN number
- Trade names
- Names of manufacturing companies
- Details of classification and labelling
- GHS concentration limits
- Control measures in accordance with the Stockholm Convention

<sup>157</sup> In line with Guidance for the control of the import and export of POPs (UNIDO 2012)

Specific Objective 3.2 Ensured system to create an inventory of data on pesticides formulated or repackaged in BiH

The competent institutions in FBiH, RS and departments of BD Government, in collaboration with the Ministry of Foreign Trade and Economic Relations of BiH and Plant Health Protection Administration of BiH, need to ensure a system for recording and storing data on pesticides that are formulated or and packaged in BiH. The system for recording and storing should be established on a unique pattern, supported by a computer program, which enables easy search and assessment of import or production according to certain criteria.

#### **Main Objective 4: Ensuring an adequate waste management system for plant protection products**

The preliminary inventory of POPs pesticides has shown that import and use of POPs pesticides from the list of the Stockholm Convention are banned in BiH. The POPs Pesticides Inventory Group concluded that POPs pesticides are not applied in BiH, nor are there any stockpiles and wastes of POPs pesticides. Therefore, there are no proposed specific measures and activities to reduce releases from stockpiles and wastes. Measures relating to ensuring adequate disposal of pesticide packaging were proposed within the Specific Objective 4.1 of this Action Plan. Other planned activities in this action plan relating to establishment of a coordination mechanism and improvement of the institutional framework for the implementation of the Stockholm Convention and adequate and quick reaction in prohibiting the manufacture, import and application of pesticides in case some of them should be included to the list of the Convention, are extremely important for the reduction of releases of POPs pesticides from stockpiles and wastes.

Specific Objective 4.1 Ensured adequate disposal of empty packaging of POPs pesticides

According to the *Regulation on the Duties of Users of Phytopharmaceutical Agents (Official Gazette of BiH no. 101/12)* users of phytopharmaceutical agents (PPA) are obligated to dispose of the empty packaging in compliance with the directions indicated on the label. The user is also obligated, in accordance with the regulations governing hazardous waste, to dispose of empty containers and residues of PPA, wastes contaminated with PPA that occur during remediation of accidents and PPA which registration is no longer valid or are past their expiration dates indicated on the label. The following actions are recommended:

- Immediately after using the product, triple rinse the container with clean water and pour the liquid into the solution in the tank of the equipment for plant protection (sprinklers and air assisted sprayers);
- After pouring the liquid into the tank of the equipment for plant protection (sprinklers and air assisted sprayers) add water and use the dilute solution on already treated surfaces;
- It is forbidden to wash the equipment near rivers and other surface waters or to pour the remaining contents of the pesticide solution into rivers, near the roads or populated areas;
- Puncture the empty container and its cap in 3 places, put it in a plastic bag and take it back to the commercial yard, and later return it to the appropriate *collection site* in the region, i.e. after using PPA, the container must be disposed of in compliance with the instructions on the label and instructions for use.

For the purpose of introducing the importers of pesticides, companies engaged in wholesale and retail sale of pesticides, agricultural producers and users of pesticides with the obligations and procedures for dealing with packaging, a mini-campaign, within the action plan, was proposed in order to raise public awareness, in terms of preparing informational leaflets and posters and their distribution to stakeholders.

Furthermore, the entity ministries (and departments of BD Government) responsible for agriculture and water management in cooperation with entity ministries (and departments of BD Government) responsible for the environment should build a system which will enable the user of PPA to deliver the used, washed containers to the *collection site* where they will be taken by a company authorized for the disposal of hazardous wastes.

#### **Main Objective 5: Strengthening the capacity for monitoring POPs pesticides (plant protection products) in the environment and living organisms, including identification of waste and locations potentially contaminated with POPs pesticides (plant protection products)**

Specific Objective 5.1 Measurement of potential pesticide residues at critical locations (“hot-spots”) where POPs pesticides have been previously used

Considering that during the inventory the POPs Pesticides Inventory Group concluded that there is a lack of systematic monitoring of POPs pesticides, it has been proposed within this action plan that the entity ministries (and departments of BD Government) responsible for agriculture, forestry and water management in cooperation with entity ministries (and departments of BD Government) responsible for the environment carry out soil sampling and analysis of POPs pesticide residues (DDT, lindane, endosulfan) at 7 critical locations which were suggested by the POPs Pesticides Inventory Group in the Chapter 2.3.1, which were selected according to the intensity of agricultural production (agricultural production was very intensive at these locations in the past and so it is today as well):

- AIPK “Mladen Stojanović” – Nova Topola
- Plantaže Gradiška – Trebovljani
- PIK “Šamac” – Šamac
- Institute of Agricultural Economics in Banja Luka - Banja Luka- Trapisti
- Agricultural Institute Butmir- Sarajevo
- “HEPOK” Mostar
- Organization of Associated Labour for the purchase and processing of tobacco “Bosanac” in Orašje

Due to the fact that these large manufacturing conglomerates were active forty years ago, the POPs Pesticides Inventory Group stated that there is possibility that certain POP pesticides have been used on these locations.

The institutions responsible for monitoring soil quality should carry out soil sampling and analysis of pesticide residues in accredited laboratories. During the drafting of the preliminary inventory, the POPs Pesticides Inventory Group was informed by the Federal Institute for Agropedology that during the period 2008-2011 the Institute carried out monitoring of presence of 15 polycyclic aromatic hydrocarbons (PAHs) in soil at 260 locations. The Group was unable to obtain data on other substances (including POPs pesticides) listed under the Annexes to the Stockholm Convention. Furthermore, the POPs Pesticides Inventory Group was unable to obtain data from the Agricultural Institute of RS in relation to the monitoring of POPs pesticides in soil.

*Table 168:*  
Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)

Action Plan 3.3.3: Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)		
Objectives	Activities	Time frame
<b>Main Objective 1. Improving the institutional framework for the management of POPs pesticides</b>		
<b>Specific Objective 1.1</b> Additionally trained and strengthened capacity of institutions and inspection	<b>Activity 1.1.1</b> Organization of training programs for the competent institutions on the management of pesticides and disposal of waste containing pesticides	2016-2017
	<b>Activity 1.1.2</b> Organization of training programs for inspection bodies on the transport of pesticides	2016-2017
<b>Main Objective 2. Enhancing or creating an adequate legal framework related to all aspects of POPs pesticides management</b>		
<b>Specific Objective 2.1</b> Drafted, updated and harmonized laws and bylaws relating to the import and transport of pesticides	<b>Activity 2.1.1</b> Creating new by-laws and updating existing legislation in order to build a uniform system for registration and import of plant protection products ( <i>Regulation on the content of the documentation necessary for the registration of plant protection products</i> ) and biocides (in FBiH and BD)	2015
	<b>Activity 2.1.2</b> Drafting of a regulation that would regulate the mandatory data entry of imported pesticides at border crossings in BiH	2015
<b>Specific Objective 2.2</b> Laws and implementing legislation concerning monitoring of POPs pesticides harmonized with the relevant EU provisions	<b>Activity 2.2.1</b> Development of new and updating of existing laws and bylaws concerning monitoring of POPs pesticides in order to comply with the relevant EU legislation and harmonization between the entities and BD	

In addition, it will be necessary to identify the sites contaminated with POPs pesticides in the coming period. This activity is treated in detail within the *Strategy for the Action Plan 3.3.13: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner*.

#### Specific Objective 5.2 Control of the components of pesticide formulations

The Plant Health Protection Administration of BiH should, in cooperation with Indirect Taxation Authority of BiH (Customs Sector) and the entity ministries (and departments of BD Government) responsible for agriculture, forestry and water management and for health care, provide a mechanism for sampling pesticides at the border, with the aim to determine whether the pesticides that are imported have adequate composition or contain prohibited pesticides (including POPs pesticides).

### Main Objective 6: Raising awareness of target groups

#### Specific Objective 6.1 Undertaken activities to educate and raise awareness of target groups

The main purpose of raising awareness, informing and educating of target groups with regard to POPs pesticides and pesticides in general is to prevent incorrect and unnecessary use of plant protection products and biocides, through training of agronomists and direct users of phytopharmaceutical agents, counsellors for chemicals, and other people who use pesticides (plant protection products and biocides). Phytopharmaceutical agents are applied throughout the whole country, especially in agricultural areas on river valleys and in the largest agricultural areas. Improper application of pesticides and inadequate management of wastes from unused phytopharmaceutical agents and biocides can cause environmental contamination. Furthermore, the Council of Ministers of BiH has, at the 26<sup>th</sup> Session held on 12 November 2012, adopted the *Regulation on the Duties of Users of Phytopharmaceutical Agents* (Official Gazette of BiH, no. 101/12) that regulates the general and specific obligations of the users of phytopharmaceutical agents which, if implemented properly, could prevent the possibility of contamination of the environment and agricultural products and poisoning of people. For this purpose it is essential to continuously educate the users of phytopharmaceutical agents. This task is to be carried out by the Plant Health Protection Administration of BiH and other competent entity institutions.

Action plan for management of POPs pesticides (Table 168) includes the planned measures and activities that need to be implemented for the successful implementation of all obligations under the Stockholm Convention in BiH, identifies institutions responsible for their implementation, as well as the time frame and the estimated necessary funds.

Competent institution/organization	Stakeholders	Estimated financial resources
BiH: PHPA FBiH: FMAWMF; FMH RS: MAFWM; MHSW BD: DAFWM, DHOS	MoFTER; Entity ministries and departments of the BD Government responsible for the environment	Regular activities within the budget FBiH: 9,500 BAM RS: 9,500 BAM BD: 1,000 BAM Funds needed for organization of training programme and recruitment of specialized consultants
BiH: - FBiH: FAII RS: RAIA BD: Inspectorate of BD Government		Regular activities within the budget FBiH: 9,500 BAM RS: 9,500 BAM BD: 1,000 BAM Funds for organization of training programme and recruitment of specialized consultants
BiH: PHPA (coordination) FBiH: FMAWMF; FMH RS: MAFWM; MHSW BD: DAFWM, DHOS	Administrations for inspection affairs of FBiH, RS and BD; Importers of pesticides	Regular activities within the budget FBiH: 10,000 BAM RS: 5,000 BAM BD: 10,000 BAM
BiH: PHPA, ITA FBiH: FMAWMF; FMH RS: MAFWM; MHSW BD: DAFWM, DHOS	Administrations for inspection affairs of FBiH, RS and BD; Importers of pesticides	Regular activities within the budget FBiH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM

*This activity is described in detail in Action Plan 3.3.18. Research, development and monitoring*

Action Plan 3.3.3: Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)		
Objectives	Activities	Time frame
<b>Main Objective 3. Strengthening technical capacity for collecting, organizing, structuring and processing of data on pesticides</b>		
<b>Specific Objective 3.1</b> Established a system for identifying, recording and storing data relating to the import of plant protection products (using phyto-pharmaceutical means) at border crossings in BiH	<b>Activity 3.1.1</b> Updating existing databases with information on biocides and plant protection products in the RS and preparing those in the FBiH and BD. This activity is related to the implementation of Activity 2.1.2 of this Action Plan	2016
	<b>Activity 3.1.2</b> Training employees of institutions responsible for maintaining registers of chemicals	2016
<b>Specific Objective 3.2</b> Ensured system to create an inventory of data on pesticides formulated or repackaged in BiH	<b>Activity 3.2.1</b> Drafting the following regulations: <ul style="list-style-type: none"> <li>▪ Regulation on technical and human resource conditions to be fulfilled by a company engaged in the formulation of biocides and pesticides - in FBiH and BD and for plant protection products in RS</li> <li>▪ Regulation on recording and inventorying the amount formulated and repackaged preparations</li> </ul>	2015
<b>Main Objective 4. Ensuring an adequate waste management system for plant protection products</b>		
<b>Specific Objective 4.1</b> Ensured adequate disposal of empty packaging of POPs pesticides	<b>Activity 4.1.1</b> Purchase of <b>eight (8)</b> containers which would be placed before the agricultural pharmacies in Gradiska, Bijeljina, Mostar and Gradačac, and which will be used by agricultural producers for the disposal of packaging waste from plant protection products (phytopharmaceutical agents)	2016
	<b>Activity 4.1.2</b> Drafting legal framework which would define the obligations and procedures for waste disposal of plant protection products, as well as the packaging of the used plant protection products	2016
<b>Main Objective 5. Strengthening the capacity for monitoring POPs pesticides (plant protection products) in the environment and living organisms, including identification of waste and locations potentially contaminated with POPs pesticides</b>		
<b>Specific Objective 5.1</b> Measurement of potential pesticide residues at critical locations ("hot-spots") where POPs pesticides have been previously used	<b>Activity 5.1.1</b> Samples and analysis of the POPs pesticides (DDT, Lindane, Endosulfan) from seven locations proposed in the preliminary inventory <ul style="list-style-type: none"> <li>▪ AIPK "Mladen Stojanović" – Nova Topola</li> <li>▪ Plantaže Gradiška – Trebovljani</li> <li>▪ PIK "Šamac" – Šamac</li> <li>▪ Institute of Agricultural Economics in Banja Luka - Banja Luka- Trapisti</li> <li>▪ Agricultural Institute Butmir- Sarajevo</li> <li>▪ "HEPOK" Mostar</li> <li>▪ Organization of Associated Labour for the purchase and processing of tobacco "Bosanac" in Orašje</li> </ul>	2015-2016
	<b>Activity 5.1.2</b> Identification and remediation of sites contaminated with POPs pesticides	
<b>Specific Objective 5.2</b> Control of the components of pesticide formulations	<b>Activity 5.2.1</b> Development of <i>Regulations on obligation to control the content and composition of pesticides</i>	2016
	<b>Activity 5.2.2</b> Development of existing laboratories to analyze the content of pesticides and establishing a plan to control the substances listed in the Stockholm Convention in pesticide compositions <i>The development of laboratories for accreditation is described in detail within the Action Plan 3.3.18: Research, development and monitoring.</i>	2017

Competent institution/ organization	Stakeholders	Estimated financial resources
BiH: MCA, MoFTER (coordination) FBiH: FMH RS: MHSW BD: DHOS	PHPA; ITA; Entity ministries and departments of the BD Government responsible for agriculture, water management and forestry; Administrations for inspection affairs of FBiH, RS and BD	Regular activities within the budget FBiH: 30,000 BAM RS: 20,000 BAM BD: 10,000 BAM Funds needed for recruitment of specialized consultants (as needed)
BiH: MCA, MoFTER (coordination) FBiH: FMH RS: MHSW BD: DHOS	PHPA; Entity ministries and departments of the BD Government responsible for agriculture, water management and forestry; Administrations for inspection affairs of FBiH, RS and BD; ITA	Regular activities within the budget FBiH: 10,000 BAM RS: 8,000 BAM BD: 2,000 BAM Funds needed for recruitment of specialized consultants
BiH: PHPA (coordination) FBiH: FMAWMF; FMH RS: MAFWM; MHSW BD: DAFWM	MoFTER, Administrations for inspection affairs of FBiH, RS and BD; ITA; Other relevant ministries; Companies engaged in the formulation and packaging of pesticides	Regular activities within the budget FBiH: 10,000 BAM RS: 6,000 BAM BD: 10,000 BAM
BiH: PHPA FBiH: FMAWMF RS: MAFWM BD: DAFWM	Importers of pesticides; companies engaged in wholesale and retail trade of pesticides; Agricultural producers; Companies engaged in management of hazardous wastes	FBiH: 5,000 BAM RS: 5,000 BAM
BiH: PHPA FBiH: FMAWMF; FMLSP RS: MAFWM; MHSW BD: DAFWM	MoFTER; PHPA; Entity ministries of agriculture and health and departments of BD Government responsible for agriculture, water management and forestry; Administrations for inspection affairs of FBiH, RS and BD; Importers of pesticides; Companies engaged in wholesale and retail trade of pesticides; Agricultural producers; Companies engaged in management of hazardous wastes	Regular activities within the budget FBiH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
BiH: - FBiH: FMAWMF; FMET RS: MAFWM; MoPPCEE BD: -	Administrations for inspection affairs of FBiH, RS and BD; other relevant ministries; laboratories/institutes/ departments for the analysis of pesticides in soil, at locations suggested by relevant ministries	Regular activities within the budget FBiH: 1,500 BAM RS: 2,000 BAM Funds for the recruitment of laboratory
<i>This activity is described in detail in Strategy with Action Plan.3.13: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner</i>		
BiH: ITA, PHPA FBiH: FMAWMF; FMH RS: MAFWM; MHSP BD: DAFWM	Administrations for inspection affairs of FBiH, RS and BD	Regular activities within the budget FBiH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
BiH: UZZB (koordinacija) FBiH: FMPVŠ RS: MPŠV BD: OPŠV	Administrations for inspection affairs of FBiH, RS and BD; Laboratories for the analysis of pesticides	Regular activities within the budget FBiH: 10,000 BAM RS: 10,000 BAM

Action Plan 3.3.3: Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)		
Objectives	Activities	Time frame
<b>Main Objective 6. Raising awareness of target groups</b>		
<b>Specific Objective 6.1</b> Undertaken activities to educate and raise awareness of target groups	<b>Activity 6.1.1</b> Introducing agronomists from professional services and importers and distributors of pesticides, as well as agronomists from the agricultural pharmacies, and authorized companies for DDD with POPs pesticides. Present obligations under the Stockholm Convention, related to pesticides (plant protection products and biocides) in terms of professional work and statements of agronomists at meetings held in Teslić, Neum and Trebinje and other relevant meetings.	2015
	<b>Activity 6.1.2</b> Promoting the proper use of pesticides for users of phyto-pharmaceutical products: a. Holding lectures about the appropriate use of pesticides in accordance with the Regulation on obligations of users of pharmaceutical products and biocides b. Promoting the concept of "green chemistry" in the field of pesticides: production of the brochure under the name "Green chemistry and pesticides"	2016
Expected commencement of implementation of the action plan		
Duration of the implementation of the action plan		
Total estimated required financial resources		

### 3.3.4 ACTION PLAN: PRODUCTION, IMPORT AND EXPORT, USE, IDENTIFICATION, LABELLING, REMOVAL, STORAGE AND DISPOSAL OF POLYCHLORINATED BIPHENYLS (PCBS) AND EQUIPMENT CONTAINING PCBS (ANNEX A, PART II)

#### 3.3.4.1 Objectives of PCB management

The main objective of this action plan is to ensure an adequate framework for PCB management in BiH, by defining the obligations and specific activities which need to be implemented in the forthcoming period and which are in accordance with the provisions of the Stockholm Convention. The ultimate objective is to reduce and ultimately eliminate the use of PCBs and equipment containing or contaminated with PCBs, prevent releases of PCBs into the environment, and ensure adequate conditions for the disposal of PCB wastes in an environmentally sound manner.

Table 169 provides an overview of the main and specific objectives for PCB management which need to be achieved in order to ensure the implementation of the Stockholm Convention in BiH.

Table 169:  
Main and specific  
objectives of PCB  
management

PCB management - Main and specific objectives
<b>Main Objective 1. Improving the institutional framework for the management of PCB</b>
Specific objective: 1. Additionally improved and strengthened inspection
<b>Main Objective 2. Improving or creating an adequate legal framework for all aspects of PCB management (including waste containing PCBs)</b>
Specific objectives: 1. Legislation to ensure the fulfilment of all the obligations of the Stockholm Convention (relating to the management of PCB waste containing PCBs) drafted / changed / updated and adopted at the level of BiH, FBiH, RS and BD 2. Laws and bylaws relating to occupational safety and monitoring of PCB comply with relevant regulations and best practices of the EU
<b>Main Objective 3. Ensuring adequate management of PCBs and equipment containing or contaminated by PCBs, including previous detailed inventory</b>
Specific objectives: 1. Detailed inventory of equipment containing or contaminated with PCBs 2. Phase-out management plan for equipment containing or contaminated by PCBs is developed and fully implemented 3. Ensured adequate area for the temporary storage of equipment containing or contaminated with PCBs



Competent institution/ organization	Stakeholders	Estimated financial resources
BiH: PHPA (coordination) FBiH: FMAWMF RS: MAFWM BD: DAFWM	Agriculture experts; Counsellors for chemicals, and other people who use pesticides (plant protection products and biocides)	Regular activities within the budget FBiH: 1,000 BAM RS: 1,000 BAM BD: 500 BAM Funds for participation at meetings
BiH: PHPA (coordination) FBiH: FMAWMF RS: MAFWM BD: DAFWM	Agriculture experts; Agricultural producers; Institutions authorized to train agricultural producers	Regular activities within the budget FBiH: 9,000 BAM RS: 9,000 BAM BD: 2,000 BAM Funds for organization of workshops, meetings and printing of brochures
<b>Upon the adoption of the NIP</b>		
<b>2015 -2018</b>		
<b>272,000 BAM FBiH: 115,500 BAM, RS: 100,000 BAM, BD: 56,500 BAM</b>		

#### PCB management - Main and specific objectives

**Main Objective 4. Ensuring an adequate hazardous waste management system (with a focus on waste containing PCBs) in accordance with the provisions of the Basel Convention**

Specific objective:

1. Established, harmonized and operational management systems for special categories of waste, including waste containing PCBs

#### **Main Objective 6. Raising awareness and educating the public and the target groups**

Specific objective:

1. Undertaken actions to educate and raise awareness of the target groups (decision-makers, authorities responsible for environmental protection, the industry and the public) of the characteristics of PCBs and their environmentally sound management

### 3.3.4.2 Planned activities and measures for PCB management

With respect to the requirements of the Stockholm Convention relating to PCB management, all Parties are obligated to:

- Cease production of PCBs as soon as the Convention comes into force;
- Prohibit import and export of PCBs and equipment containing PCBs except for the purpose of environmentally sound waste management);
- By 2025, identify, label and remove from use equipment that contains PCBs (transformers, capacitors or other receptacles containing liquid stocks);
- Except for maintenance and servicing operations, not allow recovery for the purpose of reuse in other equipment of liquids with polychlorinated biphenyls content above 0.005%;
- Achieve environmentally sound management of wastes containing PCBs as soon as possible but not later than 2028 (liquids containing PCBs and equipment contaminated with PCBs - containing more than 0.005% by weight);
- Prohibit reuse, recycling, recovery, and direct or alternative use of PCBs;
- Develop and implement strategies for identifying stockpiles, products and items in use and wastes containing PCBs;
- Manage stockpiles in a safe, efficient and environmentally friendly manner until they become waste;
- Take measures to ensure environmentally sound handling, transportation and storage of PCBs and disposal of wastes containing PCBs. Ensure environmentally sound waste disposal, taking into account the international regulations, standards and guidelines;

- Develop strategies for identifying contaminated sites and their environmentally sound remediation;
- Every five years, provide a report on progress in eliminating polychlorinated biphenyls and submit it to the Conference of the Parties, in accordance with Article 15 of the Convention.

For the successful implementation of all obligations under the Stockholm Convention in BiH, the Action Plan for PCB management has identified specific measures and activities which need to be carried out in accordance with the defined priorities and objectives.

### **Main Objective 1: Improving the institutional framework for the management of PCB**

#### Specific Objective 1.1 Additionally improved and strengthened inspection

For the fulfilment of the provisions of the Stockholm Convention regarding the control and monitoring of equipment and waste containing PCBs, it is necessary that the administrations for inspection affairs in FBiH and RS and Inspectorate of BD Government:

- Strengthen inspectional supervision in terms of reporting equipment containing PCBs to occupational safety inspection and other relevant institutions;
- Strengthen inspectional supervision in terms of reporting wastes containing PCBs to relevant institutions.

In order to strengthen the inspection capacity of the Federal Administration for Inspection Issues, Republic Administration for Inspection Affairs of RS and the Inspectorate of BD Government, it is necessary to organize a training program for inspection officers on PCBs and equipment contaminated with PCBs, with the support of the entity ministries and departments of the BD Government in charge of environment and health protection and with recruitment of specialized consultants.

#### Main Objective 2: Improving or creating an adequate legal framework for all aspects of PCB management (including waste containing PCBs)

Specific Objective 2.1 Legislation to ensure the fulfilment of all the obligations of the Stockholm Convention (relating to the management of PCB waste containing PCBs) drafted / changed / updated and adopted at the level of BiH, FBiH, RS and BD

For the fulfilment of the provisions of the Stockholm Convention the competent institutions at BiH, FBiH, RS and BD levels need to prepare and amend existing legislation or adopt new legislation in the field of PCB management:

- Activity relating to adoption of the Law on Chemicals in FBiH and BD is identified in the *Action Plan 3.3.1 Institutional and regulatory strengthening measures*. Based on the adopted laws, these institutions need to draft and adopt bylaws which prohibit the production, import, trade and use of equipment or liquids that may contain PCBs;
- The existing Laws on Waste Management in FBiH, RS and BD require the competent ministries of environmental protection in FBiH and RS, and the Department for Spatial Planning and Property Affairs of BD to draft the regulations which will define the disposal procedures for equipment (waste) containing PCB/PCT. For the implementation of the Stockholm Convention, it is necessary that the aforementioned competent institutions in FBiH, RS and BD adopt regulations governing the handling and disposal of equipment and waste containing PCBs/PCTs, which will define:
  - the type of data needed to confirm that the equipment in question contains PCBs,
  - contents, appearance of the label, method of labelling PCB containing equipment and the premises or facilities in which they are located, as well as decontaminated devices;
  - the method of disposal of PCBs or PCB waste,
  - the method of decontaminating devices that contain PCBs;
  - test methods for determining concentrations of PCBs in equipment;
  - the contents of application data and register of devices in use that contain PCBs and PCB waste;
  - the contents of license application for decontaminating devices that contain PCB.

The new legislation needs to be harmonized with EU regulations and *Council Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)* the purpose of which is to harmonize legislation of the member states on controlling disposal of PCBs, decontamination or disposal of equipment containing PCBs and/or disposal of PCBs, so as to completely eliminate them.

The draft regulations on the use and disposal of PCBs are presented as an example in the Training Manual *“Preparation of a National Environmentally Sound Management Plan for PCBs and PCB-Contaminated Equipment”* (UNEP and the Secretariat of the Basel Convention, 2003)<sup>158</sup>. This example of regulations has been developed based on applicable regulations in several developed countries and is adapted to the specific conditions for the management of PCBs at different stages of their life cycle in developing “pilot” countries. The draft includes a list of comments relating to individual members and explaining their purpose.

- Competent ministries of environmental protection in FBiH and RS, and the Department for Spatial Planning and Property Affairs of BD should draft new or update existing legislation on waste management, which will:
  - Prohibit reclamation, recycling, recovery, and direct or alternative use of liquids with more than 0.005% of PCBs;
  - define the obligation to report about ownership of equipment containing PCBs to competent authorities (ministries responsible for environmental protection);
  - obligation to report about ownership of PCB waste and report accidents that caused leakage of PCBs into the environment to competent institutions (ministries responsible for environmental protection);
- Competent ministries of environmental protection in FBiH and RS, and the Department for Spatial Planning and Property Affairs of BD need to prepare and enable the adoption of legislation which will define the deadlines for replacing devices containing PCBs and deadlines for the disposal of wastes containing PCBs. According to the Stockholm Convention, the deadline for phasing out the use of devices containing PCBs is 2025, and for the disposal of PCB wastes is 2028. EU legislation (*Council Directive 96/59/EC on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)*) sets 2010 as the deadline for member states for the disposal of all equipment containing PCBs;
- In order to define, determine and manage contaminated sites, including sites contaminated with PCBs, the competent ministries of environmental protection in FBiH and RS, and the Department for Spatial Planning and Property Affairs of BD need to draft new or update existing legislation on environmental protection and Waste Management, which defines the management of contaminated sites. This aspect is described in detail within the *Strategy for Action Plan 3.3.13: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner*.

Specific Objective 2.2 Laws and bylaws relating to occupational safety and monitoring of PCB comply with relevant regulations and best practices of the EU

In order to protect workers who are occupationally exposed to PCBs (workers in substations, repairers of transformers and capacitors, etc.), the Federal Ministry of Labour and Social Policy (in collaboration with the Federal Ministry of Health), Ministry of Labour, War Veterans and Disabled Persons Protection of RS (in collaboration with the Ministry of Health and Social Welfare of RS), and the Department of Health and Other Services of BD should adopt regulations on occupational safety with chemicals containing PCBs which define the cases in which it is permitted to use PCBs and the conditions under which they may be used and the obligation to report about ownership of equipment containing PCBs to the competent authorities (occupational safety inspection).

In order to ensure the monitoring of PCBs in the environment, regulations in FBiH, RS and BD governing monitoring and the maximum permissible concentrations of PCBs in the environment need to be amended or new laws should be adopted and these laws should be harmonized with EU regulations. Therefore, the competent ministries in FBiH and RS in charge of environmental protection, water management, agriculture, health, as well as authorized departments of BD Government should adopt new or amend existing legislation which will:

- Determine (or amend existing) the maximum permissible concentrations of PCBs in air, drinking water, surface water, soil and sediment, in accordance with the conclusions of the preliminary inventory;
- Determine the maximum permissible emissions of PCBs from unintentional production of PCBs into air, waste water and emissions to soil and sediment;

The maximum permissible concentrations of PCBs in emissions should be specified according to the values prescribed in the EU. This objective is described in detail within the *Action Plan 3.3.18: Research, development and monitoring*.

<sup>158</sup> <http://chm.pops.int/Implementation/PCBs/Documents/Publications/tabid/665/Default.aspx>

### **Main Objective 3: Ensuring adequate management of PCBs and equipment containing or contaminated with PCBs, including previous detailed inventory**

#### Specific Objective 3.1 Detailed inventory of equipment containing or contaminated with PCBs

In order to ensure proper management of PCBs and equipment containing or contaminated with PCBs in accordance with the provisions of the Stockholm Convention, it is necessary that the competent institutions in BiH, FBiH, RS and BD implement the following activities:

##### *Develop Technical Guidelines for the Identification and Environmentally Sound Management of Equipment or Products Containing or Contaminated with PCBs*

The competent ministries of environmental protection in FBiH and RS and the Department for Spatial Planning and Property Affairs of BD should develop *Technical Guidelines for the Identification and Environmentally Sound Management (decontamination, storage, transport and final disposal) of Equipment or Products Containing or Contaminated with PCBs*. Development of these guidelines should be coordinated by the Ministry of Foreign Trade and Economic Relations of BiH in order to ensure that the same technical guidelines are used in FBiH, RS and BD. These guidelines should provide clear instructions for the owners of equipment containing PCBs and servicers of transformers and capacitors, on how to identify, record and label equipment containing or contaminated with PCBs, how to use and manage them in a safe manner, how to properly store equipment and how to report about owning equipment to relevant institutions. Furthermore, the guidelines should give instructions to operators authorised for management of waste containing PCBs. Within the framework of the *Med Partnership Project, Sub-component 2.3. "Environmentally sound management of equipment, stocks and wastes containing or contaminated by PCBs in national electricity companies of Mediterranean countries"* which is being implemented in BiH until the end of 2014, a handbook for PCBs management has been developed, which includes general information about PCBs, safety aspects, field sampling and verification, maintenance of equipment containing PCBs, conditions for temporary storage and final disposal. This handbook can be used for developing guidelines more quickly and easily - but it is also possible to use it as guidance.

##### *Training of technicians and repairers in proper maintenance of equipment containing PCBs*

The competent ministries of environmental protection in cooperation with MoFTEER need to organize training of owners of equipment containing PCBs and repairers of transformers and capacitors, by using the *Guidelines for the Identification and Environmentally Sound Management of Equipment or Products Containing or Contaminated with PCBs*. Training is very important for the technical staff so as to avoid cross-contamination of equipment during servicing and maintenance. Furthermore, training in proper storage of equipment containing PCBs is very important for the owners of equipment and repairers so as to prevent leakage and contamination of the environment. A training program for PCB management in BiH was organized in September 2013 within the *Med Partnership Project, Sub-component 2.3. "Environmentally sound management of equipment, stocks and wastes containing or contaminated by PCBs in national electricity companies of Mediterranean countries"*. The program covered the training of some of the institutions/organizations engaged in the management of PCBs, the representatives of electricity companies, industries, laboratories and operators of hazardous waste. The Ministry of Foreign Trade and Economic Relations of BiH in cooperation with the competent ministries of environmental protection in FBiH and RS, and the Department for Spatial Planning and Property Affairs of BD should revise the implemented training program and organize new training for entities that were not covered.

##### *Establish information systems – database of owners of PCB waste and equipment containing or contaminated with PCBs*

Establishing a database of owners of equipment containing or contaminated with PCBs is one of the most important segments that ensures monitoring of PCB management. These databases should also contain data on waste containing PCBs. The first step in establishing the database is developing forms in electronic form (tabular view) for entering data on the management of PCBs which must be distributed to owners of equipment containing PCBs. The layout of the form should be determined by regulations at FBiH, RS and BD levels governing the management of PCBs. The electronic form will ensure easier input of data by the owners, and easier maintenance of the database. The second step is building database software. The software should enable entry of data listed in the forms into the databases and provide easy ways for updating and searching. Databases need to be established by the Federal Ministry of Environment and Tourism, Environmental Protection and Energy Efficiency

Fund of RS<sup>159</sup>, Department for Spatial Planning and Property Affairs of BD in coordination with the Ministry of Foreign Trade and Economic Relations of BiH.

In accordance with UNEP's "Updated General Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with POPs"<sup>160</sup> information that should be incorporated in the register includes:

- a. Name or description of the products, items or wastes;
- b. Physical state (liquid, solid, sludge, gas);
- c. Weight of the container or equipment;
- d. Weight of the material containing, consisting of or contaminated with PCBs;
- e. Number of similar containers or parts of the equipment;
- f. Concentrations of PCBs in the product, item or waste;
- g. Other hazards related to the material (e.g. flammable, corrosive);
- h. Location;
- i. Information about the owner;
- j. Information contained on identification labels, serial numbers, signs, etc.;
- k. Date of entry into the database;
- l. Date of removal from the inventory and description of the location and method of the final disposal (if possible).

Ensuring coherence in the type and number of data collected by databases and information exchange among aforementioned relevant institutions FBIH, RS and BD, and the Ministry of Foreign Trade and Economic Relations of BiH is of crucial importance for the functioning of the system and for summing data at the level of BiH, and it constitutes the basis for drafting periodic reports which BiH is required to submit to the Secretariat of the Convention.

Considering that Registers of Plants and Pollution, based on the *Regulation (EC) No 166/2006 concerning the establishment of a European Pollutant Release and Transfer Register* are established in the relevant ministries of environmental protection in FBIH and RS<sup>161</sup>, it is necessary to consider the possibility of this database of owners of equipment containing or contaminated with PCBs and PCBs waste being part of the existing Registers of Plants and Pollution. With the establishment of these registers the entity ministries responsible for environmental protection and the competent department of the Government of BD are obligated to submit data to the Ministry of Foreign Trade and Economic Relations of BiH, who submits the pooled data to relevant international institutions, the European Environment Agency, etc. These data should be available to the public. If it is technically not possible to include the database of owners of PCB equipment in the existing Registers of Plants and Pollution, it is necessary to establish a separate register.

*Draft the procedures for verification of data obtained from the owners of equipment and waste containing PCBs*

In order to verify the data provided by the owners of equipment and waste containing PCBs, the entity ministries (and department of BD Government) that are responsible for environmental protection need to develop the procedures for the verification of data entered into the database.

A detailed inventory of PCB waste and equipment containing or contaminated with PCBs

All Parties to the Stockholm Convention are obligated to develop and implement strategies for identifying stockpiles, products and items in use and wastes containing PCBs. Therefore, one of the key segments of the implementation of the Convention and PCB management is developing a detailed inventory of equipment containing PCBs and PCB waste. The inventory developed within the project "Enabling Activities to Facilitate Early Action on the Implementation of the Stockholm Convention on Persistent Organic Pollutants in BiH" presents the preliminary inventory which was developed within the duration of the project and financial resources. Therefore, this preliminary inventory is not conclusive and needs be completed. The detailed inventory should be developed by the ministries responsible for the environment in FBIH and RS (in cooperation with the ministries responsible for energy, mining and industry), Department for Spatial Planning and Property Affairs of BD in collaboration

<sup>159</sup> In RS, according to the Law on Waste Management (Official Gazette of RS, no. 111/13 Environmental Protection and Energy Efficiency Fund of RS keeps the register of devices in use that contain PCBs, and keeps and updates the database of waste management.

<sup>160</sup> <http://chm.pops.int/Implementation/PCBs/Documents/Publications/tabid/665/Default.aspx>

<sup>161</sup> In Brecko District the register needs to be established.

with the Ministry of Foreign Trade and Economic Relations of BiH, which would coordinate the development of inventories between entities. During the developing of the detailed inventory, the information that owners of equipment and waste containing PCBs submitted to the aforementioned competent institutions in FBiH, RS and BD and the verifications carried out by the Administration for Inspection Affairs of FBiH and RS and the Inspectorate of Government of BD, should be taken into account. Basic information about amounts of PCB containing equipment in BiH was provided within the preliminary inventory, however this information should be verified and included in the detailed analysis of the situation in BiH relating to equipment in operation, stocks of old equipment in industrial and power plants, oils containing or contaminated with PCBs and PCB waste. The inventory should be developed in accordance with EU standards and guidelines and based on best practices and experiences of EU countries. The results of the detailed inventory should serve as a basis for entering information into the database.

In order to develop the detailed inventory, the aforementioned institutions responsible for developing the inventory need to form teams that will undergo training. In addition to other experts, the teams should consist of environmental inspectors and other relevant inspectors (energy, health, sanitation and occupational safety inspectors). For the successful development of inventory in BiH, the Ministry of Foreign Trade and Economic Relations of BiH should provide financial resources (through donations, projects, etc.) as well as recruit local and international experts for technical supervision and conduct training. In addition, it is necessary to obtain field equipment for sampling and determining whether the equipment being analysed is contaminated with PCBs. Within the *Med Partnership Project, Sub-component 2.3 "Environmentally sound management of equipment, stocks and wastes containing or contaminated by PCBs in national electricity companies of Mediterranean countries"*, MEDPOL has provided the Ministry of Foreign Trade and Economic Relations of BiH, as a partner in the project implementation in BiH, with four field analysers Dexil L2000DX for measuring the total amount of organic chlorine in transformer oil. The analysers are property of UNEP and they were delivered to the Ministry of Foreign Trade and Economic Relations of BiH for the purpose of developing the detailed inventory of PCBs. The analysers are currently stored at the premises of the Hydro-Engineering Institute of Civil Engineering Faculty of Sarajevo, given that the Institute is MEDPOL's "focal point" in BiH. Since the Ministry of Foreign Trade and Economic Relations of BiH is involved in the implementation of *Med Partnership Project*, it is necessary that this ministry coordinates the organization of developing a detailed inventory of PCBs in BiH between the entity ministries of environment in FBiH and RS and the Department for Spatial Planning and Property Affairs of BD which are responsible for carrying out these activities in the entities and BD. Before starting developing the detailed inventory, the aforementioned institutions, in cooperation with the entity ministries responsible for energy, mining and industry should carry out activities for raising awareness of owners of equipment and waste containing PCBs.

#### *Regular updating of the database (inventory)*

In order to provide the latest information on equipment containing PCBs or PCB waste in BiH, the Federal Ministry of Environment and Tourism, the Environmental Protection and Energy Efficiency Fund of RS and the Department for Spatial Planning and Property Affairs of BD need to conduct periodic updating of the databases. The updated database will serve as a basis for the preparation of reports on the implementation of the Stockholm Convention and for defining further measures that need to be implemented. The updating of the databases will be carried out based on the data submitted by owners of equipment and waste containing PCBs to the institutions in FBiH, RS and BD and the verification carried out by the relevant inspectorates.

#### *Developing a strategy for identification of PCBs in open applications*

In order to implement the provisions of the Stockholm Convention, the entity ministries responsible for environmental protection in FBiH and RS and the Department for Spatial Planning and Property Affairs of BD, in collaboration with the Ministry of Foreign Trade and Economic Relations of BiH, should also consider developing a strategy for identification of products, stocks and waste containing PCBs in open applications (additives for adhesives, sealant (silicones) and anti-corrosive paints, lubricating fluids in oils and fats, agents for laminating in papermaking, etc.).

#### *Drafting reports on equipment and waste containing PCBs*

Parties to the Convention are required to periodically (every five years) prepare a report on the progress in eliminating PCBs, and submit it to the Secretariat of the Convention. As part of this report and on the basis of data from the updated inventories (bases), the Ministry of Foreign

Trade and Economic Relations of BiH should prepare a report on progress in removal and disposal of equipment and waste containing PCBs in BiH, which will contain information on:

- Amounts of equipment containing PCBs;
- Amount of phased out equipment;
- Amount of collected waste containing PCBs, and methods of its treatment and final disposal (export).

The framework for reporting to the Secretariat of the Convention is shown in the *Action Plan 3.3.17: Reporting*.

Specific Objective 3.2 Phase-out management plan for equipment containing or contaminated by PCBs is developed and fully implemented

Based on the regulations, the adoption of which was proposed at the beginning of this action plan, the owners of equipment containing or contaminated with PCBs would be obligated to draft a Plan for Phasing-out/Decontamination of Equipment Containing PCBs and PCB Waste in BiH, which should include:

- Deadlines for replacing, disposal or decontamination of equipment containing or contaminated with PCBs;
- Plan for replacing or methods of disposal or decontamination.

These plans will serve as a basis for drafting the *Management Plan for Phasing-out/Decontamination of Equipment Containing PCBs and PCB Waste in BiH*

Specific Objective 3.3 Ensured adequate area for the temporary storage of equipment containing or contaminated with PCBs

Based on the results of the preliminary inventory, the PCB Inventory Group determined that phased out equipment containing or contaminated with PCBs is stored within the industrial and electric power companies throughout BiH. During the field visits conducted by the PCB Inventory Group it was established that some companies did not have adequate storage facilities for equipment contaminated with PCBs (e.g. at Elektrodistribucija Zenica in TS 35/(20) 10 kV Jelah there was leakage of PCBs<sup>162</sup> from capacitors which were stored underground (buried in the ground) without taking any precautionary measures, or at Subsidiary Company Brown Coal Mine "Breza" d.o.o. there was leakage of PCB fluids from dielectric capacitors that are stored in the open).

In addition, the PCB Inventory Group concluded that there are companies engaged in export of PCB equipment in BiH, and during field visits at some of these companies (e.g. Kemis d.o.o. and Kemokop d.o.o.) the Group concluded that the companies own a site for temporary storage of hazardous waste which includes PCBs.

For adequate temporary storage of equipment containing or contaminated with PCBs, the implementation of the following activities needs to be ensured:

- Developing Technical Guidelines for the Identification and Environmentally Sound Management (decontamination, storage, transport and final disposal) of Equipment or Products Containing or Contaminated with PCBs;
- Drafting a *Management Plan for Phasing-out/Decontamination of Equipment Containing PCBs and PCB Waste in BiH*;
- Identifying the required capacities and establishing a temporary storage facility for PCB waste, as part of storage area for hazardous waste.

The aforementioned activities are elaborated more fully within the framework of other objectives of this Action Plan.

#### **Main Objective 4: Ensuring an adequate hazardous waste management system (with a focus on waste containing PCBs) in accordance with the provisions of the Basel Convention**

Specific Objective 4.1 Established, harmonized and operational management systems for special categories of waste, including waste containing PCBs

In order to establish and ensure the functioning of an adequate management system for waste containing PCBs in accordance with the provisions of the Stockholm Convention, it is

<sup>162</sup> Based on the samples taken from the capacitors and the oil analysis performed by the PCB Inventory Group using qualitative technique, the capacitors contained pure PCBs.

necessary that the competent institutions in BiH, FBiH, RS and BD implement the following activities:

*Drafting a Plan for Disposal/Decontamination of Equipment Containing PCBs and PCB Waste in BiH*

According to the PCB Inventory Group, in BiH there are no plants for treatment or for final disposal of PCBs and PCB waste is exported to foreign countries, in accordance with the Basel Convention. After carrying out tests, the cement factory "Lukavac" in June 2014 received the approval of the Federal Ministry of Environment and Tourism for conducting a trial run of cement kiln in accordance with the "Operation plan with the use of alternative fuels and alternative raw materials", using alternative fuels and alternative raw materials maximum 30 % of the total fuel requirement. Even though the approval for the co-incineration of certain categories of used oils was obtained, in the cement factory "Lukavac" it is not possible to incinerate oils containing PCBs. Furthermore, the cement factory in Kakanj is planning to adjust its technological process and provide additional devices for flue gas emission control and conduct preliminary tests of incinerating alternative fuels in the near future. However, the PCB Inventory Group has no information about when it will be realized.

According to the report *Cement Kilns firing Hazardous Waste - Draft 15 April 2006*<sup>163</sup>, developed countries such as Japan, Norway, Switzerland, Germany have been using cement factories for burning hazardous waste for many years. Recently, modern cement kilns are used for destruction of waste in developing countries where, due to lack of infrastructure for environmentally sound disposal of waste and waste incineration, cement kilns represent a cost-effective option. Even in countries with well-developed infrastructure for management of hazardous waste, it may be useful to increase local capacity by using cement kilns.

Norway has been using cement factories for incineration of organic hazardous waste for more than 20 years<sup>164</sup>.

Article 50 of the *Directive 2010/75/EU on industrial emissions* which replaces *Directive 2000/76/EC on the incineration of waste* with effect from 7 January 2014, regulates the following: "If hazardous waste with a content of more than 1% of halogenated organic substances, expressed as chlorine, is incinerated, the temperature has to be raised to 1,100°C for at least two seconds. The temperature is measured near the inner wall of the combustion chamber."

In accordance with the Updated *General Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with POPs* available on the website of the Stockholm Convention<sup>165</sup>, controlled combustion process for treatment of organic pollutants, mainly in rotary kilns, may be used for incineration of hazardous waste. The treatment process involves heating at a temperature higher than 850°C, or if the chlorine content is above 1%, at a temperature above 1,100°C, with a residence time greater than two seconds, under conditions that assure appropriate mixing. Dedicated hazardous-waste incinerators are available in a number of configurations, including rotary kiln incinerators, and static ovens (for liquids only). High-efficiency boilers and lightweight aggregate kilns are also used for the co-incineration of hazardous wastes.

*General Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with POPs* also state the following:

- In cement production process, the temperature in the kiln reaches up to 1,400-1,500°C. A *Destruction and Removal Efficiency (DRE)* greater than 99,99998 % was reported for PCBs in several countries that carry out incineration of hazardous waste;
- Cement kilns have been demonstrated with PCBs, but should be applicable to other POPs;
- Air emissions may include, inter alia, nitrogen oxides, carbon monoxide, sulphur dioxide and other sulphur oxides, metals and their compounds, hydrogen chloride, fluoride, ammonia, PCDD/PCDF, benzene, toluene, xylene, polycyclic aromatic hydrocarbons, chlorobenzene and PCBs. It should be noted, however, that cement kilns can comply with PCDD and PCDF air emission levels below 0.1 ng TEQ/Nm<sup>3</sup> (as required by Directive 2010/75/EU on industrial emissions). Residues include cement kiln dust captured by the air pollution control system.

<sup>163</sup> [http://www.google.ba/url?sa=t&rlz=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CDUQFjAB&url=http%3A%2F%2Fwww.pops.int%2Fdocuments%2Fbatbep\\_advance%2Fintersessional\\_work%2FBook%25206%2520Cement%2520Kilns.doc&ei=iG\\_CU4SvNsuM4gSKvoHoBg&usq=AFQjCNGnPy5DeYo\\_CKObKp-U5X\\_8VtYcUQ&bvm=bv.70810081.d.bGE](http://www.google.ba/url?sa=t&rlz=j&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CDUQFjAB&url=http%3A%2F%2Fwww.pops.int%2Fdocuments%2Fbatbep_advance%2Fintersessional_work%2FBook%25206%2520Cement%2520Kilns.doc&ei=iG_CU4SvNsuM4gSKvoHoBg&usq=AFQjCNGnPy5DeYo_CKObKp-U5X_8VtYcUQ&bvm=bv.70810081.d.bGE)

<sup>164</sup> Karstensen Kåre Helge, SINTEF: "Can Cement Kilns be Used for PCB Disposal?" [http://www.chem.unep.ch/pops/pcb\\_activities/PCB\\_proceeding/Presentations/Kare%20Karstensen.pdf](http://www.chem.unep.ch/pops/pcb_activities/PCB_proceeding/Presentations/Kare%20Karstensen.pdf)

<sup>165</sup> <http://chm.pops.int/Implementation/PCBs/DocumentsPublications/tabid/665/Default.aspx>



At the cement factory “Lukavac” the cement production process involves baking of raw material flour at a temperature of 1,320 – 1,450°C to obtain clinker, which is used as an intermediate for the production of cement. The main source of energy is coal, but crude oil as well as alternative fuels can also be used.

According to the report of SINTEF<sup>166</sup> (the largest independent research organization in Scandinavia), it can be concluded that incineration in cement plants ensures:

- Appropriate temperature;
- Residence time;
- Conditions for mixing.

According to the same report, the PCBs can be safely destroyed in cement plants if:

- the cement factory is technically and chemically capable for the incineration of PCBs (should be confirmed by independent and qualified experts),
- PCBs are entered through the main kiln,
- the staff is adequately trained and competent,
- the plant is consistent with national legislation and internationally accepted principles related to health, safety and the environment.

In order to ensure the fulfilment of the provisions of the Stockholm Convention related to the disposal of waste containing PCBs, the Ministry of Foreign Trade and Economic Relations of BiH is responsible for coordinating the drafting of the *Plan for Disposal/Decontamination of Equipment Containing PCBs and PCB Waste in BiH*. The Ministry of Foreign Trade and Economic Relations of BiH, needs to implement this plan in cooperation with the ministries responsible for the environment in FBiH, RS and the Department for Spatial Planning and Property Affairs of BD. This plan should enable more efficient management and final disposal of equipment and waste containing PCBs. The plan should take into account data from the plans for elimination/decontamination of equipment containing or contaminated with PCBs developed by the owners of equipment and submitted to the ministries responsible for the environment in FBiH and RS and the Department for Spatial Planning and Property Affairs of BD. During the drafting of the plan the competent ministries should consult local and international experts in the field of PCB management.

*Plan for Disposal/Decontamination of Equipment Containing PCBs and PCB Waste in BiH* should define:

- The most acceptable options for management of equipment containing PCBs and PCB waste;
- Deadlines for replacing/decontamination of equipment in accordance with the regulations.

Due to the current economic situation in BiH, and based on the amount of waste containing PCBs that can be expected after the development of the detailed inventory, the construction of a facility for the treatment of PCBs was not considered within this Action Plan. *Plan for Disposal/Decontamination of Equipment Containing PCBs and PCB Waste in BiH* will determine the most appropriate option for final disposal of equipment and waste containing PCBs, during the process of which the option of using waste oils containing PCBs as a supplementary fuel in cement factories should be considered. Until the drafting of the Plan, the operators licensed for hazardous waste disposal will continue to export PCB waste abroad for disposal, based on permits issued by the ministries responsible for the environment in FBiH and RS.

Training Manual “*Preparation of a National Environmentally Sound Management Plan for PCBs and PCB-Contaminated Equipment*” (UNEP and the Secretariat of the Basel Convention, 2003) is available on the website of the Stockholm Convention<sup>167</sup>.

*Identifying the required capacities and establishing a temporary storage facility for PCB waste, as part of storage for hazardous waste*

In BiH there are no capacities for the temporary storage of PCB waste until its final disposal. According to the results of the preliminary inventory, phased-out equipment containing or contaminated with PCBs and waste oils containing PCBs are currently stored in the industrial and electric power companies on the territory of the entire country or in facilities authorized for the disposal of hazardous waste prior to its exportation abroad.

<sup>166</sup> Karstensen Kåre Helge, SINTEF: “Can Cement Kilns be Used for PCB Disposal?” [http://www.chem.unep.ch/pops/pcb\\_activities/PCB\\_proceeding/Presentations/Kare%20Karstensen.pdf](http://www.chem.unep.ch/pops/pcb_activities/PCB_proceeding/Presentations/Kare%20Karstensen.pdf)

<sup>167</sup> <http://chm.pops.int/Implementation/PCBs/DocumentsPublications/tabid/665/Default.aspx>

According to the *Law on Waste Management of RS* (Official Gazette of RS, no. 111/13), hazardous waste cannot be temporarily stored at the site of the producer or owner of the waste for more than a year. Even though the Law on Waste Management in FBiH and BD have no time restrictions for storage of hazardous waste, the same dynamics is defined by the environmental permit. It is the obligation of the “owner of waste” to sign a contract with an authorized firm about taking over this type of waste and the environmental permit may not be issued until this is done.

The Environmental Protection Strategy of the Federation of BiH 2008-2018 and the Federal Waste Management Plan 2012-2017 require the establishment of capacities for hazardous waste in regional waste management centres (RWMC), and the establishment of a transfer station for the temporary admission of waste oils (which may be at RWMC or separate). Draft Environmental Protection Strategy in Brčko District (not yet adopted) also proposes a separate collection and treatment of hazardous waste. In RS, Waste Management Strategy of RS is not developed yet.

In order to ensure an adequate temporary storage of waste containing PCBs, which will meet all the technical requirements for storage of hazardous waste, it is necessary that the ministries responsible for the environment in FBiH and RS and the Department for Spatial Planning and Property Affairs of BD implement this activity within the dynamics of establishing RWMC which will ensure the storage facility for all types of hazardous waste.

#### *Safe final disposal of equipment containing PCBs*

In accordance with the provisions of the Stockholm Convention, Bosnia and Herzegovina as a signatory to the Convention should:

- By 2025:
  - Identify, label and remove from use equipment containing greater than 10% PCBs and volumes greater than 5 litres
  - Identify, label and remove from use equipment containing greater than 0.05% PCBs and volumes greater than 5 litres, and
  - Endeavour to identify and remove from use equipment containing greater than 0.005% PCBs and volumes greater than 0.05 litres;
- Achieve environmentally sound disposal of wastes containing PCBs as soon as possible and not later than 2028 (liquids containing PCBs and equipment contaminated with PCBs - containing more than 0.005% by weight);

For disposal of equipment and wastes containing or contaminated with PCBs substantial financial resources will be needed (the exact amount of funds will be determined after a

*Table 170:  
Action Plan 3.3.4:  
Production, import  
and export, use,  
identification,  
labelling, removal,  
storage and disposal  
of polychlorinated  
biphenyls (PCBs) and  
equipment containing  
PCBs (Annex A, Part II)*

Action Plan 3.3.4: Production, import and export, use, identification, labelling, removal, storage and disposal of polychlorinated biphenyls (PCBs) and equipment containing PCBs (Annex A, Part II)		
Objectives	Activities	Time frame
<b>Main Objective 1. Improving the institutional framework for the management of PCB</b>		
<b>Specific Objective 1.1</b> Additionally improved and strengthened inspection	<b>Activity 1.1.1</b> Organize training program for inspection bodies on PCBs and equipment containing or is contaminated with PCBs	2016-2017
	<b>Activity 1.1.2</b> Increase inspection in terms of notifying equipment containing PCBs to the relevant inspection and other relevant institutions	2016 -
<b>Main Objective 2. Improving or creating an adequate legal framework for all aspects of PCB management (including waste containing PCBs)</b>		
<b>Specific Objective 2.1</b> Legislation to ensure the fulfilment of all the obligations of the Stockholm Convention (relating to the management of PCB waste containing PCBs) drafted / changed / updated and adopted at the level of BiH, FBiH, RS and BD	<b>Activity 2.1.1</b> Develop and adopt by-laws that prohibit the production, import, transport and use of the equipment or liquids that may contain PCBs	2015

detailed inventory of PCBs in BiH and drafting the *Plan for Disposal/Decontamination of Equipment Containing PCBs and PCB Waste in BiH*).

According to Training Manual “*Preparation of a National Environmentally Sound Management Plan for PCBs and PCB-Contaminated Equipment*”, the responsibility for meeting the costs of final disposal of PCBs should be divided between various stakeholders, including authorities at all administrative levels, and owners of equipment containing PCBs. There are no solid and quick rules about how these costs should be divided among the various stakeholders. However, despite the key role played by the state and entity authorities, an effective solution for the management of PCBs demands assistance from international organizations, foundations and institutions of other developed countries. The owners of equipment and waste containing PCBs or contaminated with PCBs will need the support of relevant ministries and authorities, in order to ensure the necessary funding.

Main objective 6: Raising awareness and educating the public and the target groups

Specific objective 6.1 Undertaken actions to educate and raise awareness of the target groups (decision-makers, authorities responsible for environmental protection, the industry and the public) of the characteristics of PCBs and their environmentally sound management

In addition to raising awareness and educating representatives of the industry and decision-makers, the implementation of this Action Plan will require raising public awareness, especially during public consultation on determining the location for storage of hazardous waste within regional waste management centres. The dynamics of building these regional centres have already been slowed down because of the strong NIMBY<sup>168</sup> effect, therefore, part of the activities to raise public awareness on the management of PCBs should be linked to the activities in the field of waste management which are implemented and will be implemented in the coming period by the ministries responsible for environment protection in FBiH and RS and the Department for Spatial Planning and Property Affairs of BD.

The aspect of educating and raising awareness of the target groups (decision makers, executive authority, industry, the public) of the characteristics of PCBs and their environmentally sound management is covered within *the Action Plan 3.3.15: Public awareness, information and education*.

Action plan for management of PCBs (Table 170) includes the planned measures and activities that need to be implemented for the successful implementation of all obligations under the Stockholm Convention in BiH, identifies institutions responsible for their implementation, as well as the time frame and the estimated necessary funds.

	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: FBiH: FAI RS: RAIA BD: BD Government - Inspectorate	Entity ministries and departments of the BD Government responsible for the environment and health	Regular activities within the budget FBiH: 20,000 BAM RS: 16,000 BAM BD: 9,000 BAM Funds needed for organization of workshops and recruitment of expert consultants for the development of training programs
	BiH: FBiH: FAI RS: RAIA BD: BD Government - Inspectorate	Entity ministries and departments of the BD Government responsible for the environment, health and occupational safety; Owners of equipment and wastes containing PCBs	Regular activities within the budget
	BiH: - FBiH: FMH RS: - BD: DHOS	Entity ministries and departments of the BD Government responsible for the environment	Regular activities within the budget FBiH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM

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Action Plan 3.3.4: Production, import and export, use, identification, labelling, removal, storage and disposal of polychlorinated biphenyls (PCBs) and equipment containing PCBs (Annex A, Part II)		
Objectives	Activities	Time frame
	<b>Activity 2.1.2</b> Develop and adopt Regulation on handling and disposal of equipment and waste containing PCBs	2015
	<b>Activity 2.1.3</b> Update existing legislation on waste management that will prohibit recovery, recycling and reuse and direct reuse or alternative use of liquids containing PCBs above 0,005%, and define the obligation to register equipment containing PCBs and PCB wastes with relevant institutions, as well as to register accidents where the leakage of PCBs to the environment occurred	2015
	<b>Activity 2.1.4</b> Develop and adopt legislation that establishes deadlines for replacing equipment containing PCBs and deadlines for the disposal of waste containing PCBs	2015
<b>Specific Objective 2.2</b> Laws and bylaws relating to occupational safety and monitoring of PCB comply with relevant regulations and best practices of the EU	<b>Activity 2.2.1</b> Develop and adopt appropriate by-laws regulating the measures for safe and healthy work when exposed to chemical substances, carcinogens or mutagens.	2016
	<b>Activity 2.2.2</b> Update existing or adopt new regulations relating to the monitoring of PCBs in the environment and living organisms	
<b>Main Objective 3. Ensuring adequate management of PCBs and equipment containing or contaminated with PCBs, including previous detailed inventory</b>		
<b>Specific Objective 3.1</b> Detailed inventory of equipment containing or contaminated with PCBs	<b>Activity 3.1.1</b> Develop technical guidelines for identification and environmentally sound management (decontamination, storage, transport and final disposal) of equipment or products containing or contaminated with PCBs	2015
	<b>Activity 3.1.2</b> Organize training of technicians and service personnel for the proper maintenance of equipment containing PCBs	2016-2017
	<b>Activity 3.1.3</b> Establish databases of owners of equipment containing or contaminated by PCBs and PCB waste <i>It is necessary to consider the possibility of this database being part of the existing Registers of Plants and Pollution. If it is technically not possible to include the database of owners of PCB equipment in the existing registers, due to the data it should contain, it is necessary to establish a separate base.</i>	2016-2017
	<b>Activity 3.1.4</b> Develop procedures for verification of the data obtained from the owner of the equipment and waste containing PCBs	2016
	<b>Activity 3.1.5</b> Perform a detailed inventory of equipment containing or contaminated with PCBs and PCB waste	2016-2018
	<b>Activity 3.1.6</b> Regularly update databases of owners of equipment containing PCBs and PCB waste	2018 - 2025

Competent institution/organization	Stakeholders	Estimated financial resources
BiH: - FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM Funds for recruitment of expert consultants (as needed)
BiH: - FBiH: FMET RS: - BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget
BiH: - FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
BiH: - FBiH: FMLSP RS: MLWVDDP BD: DHOS	Entity ministries responsible for health; departments and/or institutes of public health in FBiH, RS and BD	Regular activities within the budget FBiH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM

*This activity is described in detail within the Action Plan 3.3.18: Research, development and monitoring*

BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; Owners of equipment and waste containing PCBs; Repairers of transformers and capacitors; Operators with a permit for hazardous waste management; Inspectorates of FBiH, RS and BD	Regular activities within the budget FBiH: 7,000 BAM RS: 7,000 BAM BD: 7,000 BAM Funds for recruitment of expert consultants (as needed) <sup>169</sup>
BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	FMEM; MIEM; Owners of equipment containing PCBs; Repairers of transformers and capacitors	FBiH: 30,000 BAM RS: 30,000 BAM BD: 5,000 BAM Funds needed for recruitment of professional domestic and international consultants and organization of training. Funds may be provided from the budget or from international sources / funds.
BiH: MoFTER FBiH: FMET RS: Environmental Protection and Energy Efficiency Fund of RS BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; Inspectorates of FBiH, RS and BD	Regular activities within the budget FBiH: 15,000 BAM RS: 10,000 BAM BD: 5,000 BAM Funds for recruitment of expert consultants (as needed)
BiH: - FBiH: FMET RS: MPPCEE BD: DSPPA	MoFTER; Inspectorates of FBiH, RS and BD	Regular activities within the budget FBiH: 2,000 BAM RS: 2,000 BAM BD: 2,000 BAM Funds needed for recruitment of professional domestic consultant
BiH: MoFTER (coordination) FBiH: FMET in cooperation with FMEM RS: MPPCEE and Environmental Protection and Energy Efficiency Fund of RS in cooperation with MIEM BD: DSPPA	Owners of equipment containing PCBs; Inspectorates of FBiH, RS and BD	FBiH: 200,000 BAM RS: 100,000 BAM BD: 10,000 BAM Funds needed for recruitment of specialized consultants and providing the equipment for field sampling and analysis. Funds may be provided from international sources / funds. (through donations, projects, etc.).
BiH: - FBiH: FMET RS: Environmental Protection and Energy Efficiency Fund of RS BD: DSPPA	MoFTER; Owners of equipment and waste containing PCBs; Inspectorates of FBiH, RS and BD	Regular activities within the budget FBiH: 35,000 BAM (5,000 BAM/year) RS: 21,000 BAM (3,000 BAM/ year) BD: 3,500 BAM (500 BAM/ year) Funds needed for database maintenance

<sup>169</sup> Within the Med Partnership Project, Sub-component 2.3 "Environmentally sound management of equipment, stocks and wastes containing or contaminated by PCBs in national electricity companies of Mediterranean countries" which is being implemented in BiH until the end of 2014, a handbook for PCBs management has been developed. This handbook can be used for developing guidelines more quickly and easily - but it is also possible to use it as guidance.

Action Plan 3.3.4: Production, import and export, use, identification, labelling, removal, storage and disposal of polychlorinated biphenyls (PCBs) and equipment containing PCBs (Annex A, Part II)		
Objectives	Activities	Time frame
	<b>Activity 3.1.7</b> Develop guidelines for identification of PCBs in open applications	2018
	<b>Activity 3.1.8</b> Develop a report on equipment and waste containing PCB (discussed in detail within the <i>Action Plan 3.3.17: Reporting</i> )	Every 5 years
<b>Specific Objective 3.2</b> Phase-out management plan for equipment containing or contaminated by PCBs is developed and fully implemented	<b>Activity 3.2.1</b> Develop a phase-out management plan to exclude from use / decontaminate equipment containing or contaminated with PCBs	2016-2017
	<b>Activity 3.2.2</b> Implement the phase-out management plan to exclude from use / decontaminate equipment containing or contaminated with PCBs	2017-2025
<b>Specific Objective 3.3</b> Ensured adequate area for the temporary storage of equipment containing or contaminated with PCBs	<b>Activity 3.3.1</b> This activity is specified within Activities 3.1.1, 4.1.2 and 4.1.3. of this Action Plan	-
<b>Main Objective 4. Ensuring an adequate hazardous waste management system (with a focus on waste containing PCBs) in accordance with the provisions of the Basel Convention</b>		
<b>Specific Objective 4.1</b> Established, harmonized and operational management systems for special categories of waste, including waste containing PCBs	<b>Activity 4.1.1</b> Establish information systems - database of PCB waste (this activity is specified within Activity 3.1.3 of this Action Plan)	-
	<b>Activity 4.1.2</b> Develop a plan of disposal / decontamination of equipment containing PCBs and PCB waste in BiH	2018
	<b>Activity 4.1.3</b> Identify the necessary capacities and establish temporary storage facilities for PCB waste, as part of hazardous waste storage	2017 – 2020
	<b>Activity 4.1.4</b> Safely dispose of equipment containing PCBs	2017-2025
<b>Main objective 5. Raising awareness and educating the public and the target groups</b>		
<b>Specific objective 5.1</b> Educating and raising awareness of the target groups (decision-makers, authorities responsible for environmental protection, the industry and the public) of the characteristics of PCBs and their environmentally sound management	<i>This objective is treated in detail within the Action Plan 3.3.15: Public awareness, information and education</i>	
<b>Expected commencement of implementation of the action plan</b>		
<b>Duration of the implementation of the action plan</b>		
<b>Total estimated required financial resources</b>		

\* Total estimated financial resources for implementing this action plan do not include:

- cost of replacing and disposing of equipment;
- resources for establishing a temporary storage area for hazardous waste

These costs will be determined upon the finalization of Activity 3.1.5, Activity 4.1.2 and Activity 4.1.3 of this Action Plan.

	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; Owners of equipment and waste containing PCBs; Inspectorates of FBiH, RS and BD	Regular activities within the budget FBiH: 15,000 BAM RS: 10,000 BAM BD: 5,000 BAM Funds needed for recruitment of expert consultants
	BiH: MoFTER in cooperation with FMET, MPPCEE and DSPPA	Entity ministries and departments of the BD Government responsible for health and the environment; Inspectorates of FBiH, RS and BD	Regular activities within the budget BiH: 10,000 BAM Funds for recruitment of expert consultants (as needed)
	BiH: - FBiH: Owners of equipment, FMET RS: Owners of equipment, MPPCEE BD: Owners of equipment, DSPPA	Inspectorates of FBiH, RS and BD	Obligation of the owner of the equipment
	BiH: MoFTER (coordination) FBiH: Owners of equipment, FMET RS: Owners of equipment, MPPCEE BD: Owners of equipment, DSPPA	Inspectorates of FBiH, RS and BD	At this stage it is not possible to determine the cost of implementation of the Plan <sup>170</sup> . Since the owners of the equipment will not be able to bear the cost of replacing the equipment and its disposal, it will be necessary to provide financial resources (international donations, projects) for the implementation of the Plan.
	-	-	-
	-	-	-
	BiH: MoFTER FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; Inspectorates of FBiH, RS and BD; Operators with a permit for hazardous waste treatment	BiH: 100,000 BAM Funds needed for recruitment of expert consultants. Funds may be provided from the budget or international sources / funds (through donations, projects, etc.).
	BiH: - FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; Inspectorates of FBiH, RS and BD; Operators with a permit for hazardous waste treatment	It is necessary to ensure financial resources (estimate of cca. 100,000 KM/ warehouse) Funds may be provided from international sources / funds (through donations, projects, etc.).
	BiH: MoFTER (coordination) FBiH: FMET; Owners of equipment and waste containing PCBs; Operators with a permit for hazardous waste management RS: MPPCEE; Owners of equipment and waste containing PCBs; Operators with a permit for hazardous waste management BD: DSPPA; Owners of equipment and waste containing PCBs; Operators with a permit for hazardous waste management	Other competent state, entity and cantonal ministries and departments of the BD Government; Operators with a permit for hazardous waste treatment; Inspectorates of FBiH, RS and BD	The required financial resources will be determined upon the finalization of the Activity 3.1.5 and 4.1.2
<b>Upon the adoption of the NIP</b>			
<b>2015-2025</b>			
<b>736,500 BAM *</b> <b>(BiH: 110,000 BAM, FBiH: 344,000 BAM, RS: 216,000 BAM, BD: 66,500 BAM)</b>			

<sup>170</sup> The costs of disposal of PCB waste amount to 5 USD / kg (Source: Secretariat of the Basel Convention: Destruction and Decontamination Technologies for PCBs and other POPs Wastes Under the Basel Convention - A Training Manual for Hazardous Waste Project Managers)

### 3.3.5 ACTION PLAN: PRODUCTION, IMPORT AND EXPORT, USE, STOCKPILES AND WASTES OF HEXABDE AND HEPTABDE (ANNEX A, PART IV) AND TETRABDE AND PENTABDE (ANNEX A, PART V) AND HBB, WHERE APPLICABLE (ANNEX A, PART I)

#### 3.3.5.1 Objectives of PBDEs management

The main objective of this action plan is to ensure an adequate framework for PBDE management in BiH, by defining the obligations and specific activities which need to be implemented in BiH in the forthcoming period and which are in accordance with the provisions of the Stockholm Convention. The ultimate objective is to gradually reduce and ultimately eliminate the use of equipment containing or contaminated with PBDEs, prevent releases of PBDEs into the environment, and ensure adequate conditions for the disposal of PBDE waste in an environmentally sound manner.

Table 171 provides an overview of the main and specific objectives for PBDE management and objectives necessary to be achieved in order to ensure the implementation of the Stockholm Convention in BiH.

*Table 171:  
Main and specific  
objectives of PBDEs  
management*

PBDEs management - Main and specific objectives
<p><b>Main Objective 1: Improving the legal framework for the management of PBDEs</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Legislation ensuring the fulfilment of all commitments related to PBDEs from the Stockholm Convention is prepared/changed/updated and adopted at BiH, FBiH, RS and BD level</li> </ol>
<p><b>Main Objective 2: Strengthening technical capacity for collecting, organizing, structuring and processing data on PBDEs in BiH, including the establishment and coordination of information systems in FBiH, RS and BD, and improve the exchange of information between the competent institutions</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Established and made operational information systems for management of chemicals, including PBDEs, in FBiH, RS and BD</li> <li>2. Established and made operational information systems for hazardous waste management in FBiH, RS and BD, including PBDEs</li> </ol>
<p><b>Main Objective 3: Ensuring an adequate hazardous waste management system (with a focus on waste containing PBDEs)</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Established, harmonized and made operational systems of management of special waste categories that relate to waste containing EEE and waste vehicles</li> <li>2. Strengthened control mechanism of management of special categories of waste, especially in areas where system operators have the leading role (e.g. waste from EEE)</li> </ol>
<p><b>Main Objective 4: Improving institutional framework for management of PBDEs</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Strengthened capacities for amendment and effective implementation of the adopted legislation through training and education of relevant staff</li> <li>2. Advanced and strengthened inspection</li> </ol>

#### 3.3.5.2 Planned activities and measures for PBDEs management

The implications of the implementation of the Stockholm Convention in terms of “new” chemicals including PBDEs consist of:

- Undertaking control measures for each chemical listed under the Stockholm Convention (Article 3 and 4);
- Developing an inventory of chemicals in stockpiles (Article 6);
- Developing and updating the National Implementation Plan (Article 7);
- Inclusion of “new” chemicals (including PBDEs) in reporting (Article 15);
- Inclusion of “new” chemicals (including PBDEs) in the Programme to Support the Effectiveness Evaluation (Article 16).

For the successful implementation of all obligations of the Stockholm Convention in BiH, the Action Plan for PBDEs management has identified specific measures and activities to be implemented, in accordance with defined priorities and objectives.



### **Main Objective 1: Improving the legal framework for the management of PBDEs**

Specific Objective 1.1 Legislation ensuring the fulfilment of all commitments related to PBDEs from the Stockholm Convention is prepared/changed/updated and adopted at BiH, FBiH, RS and BD level

For the fulfilment of the provisions of the Stockholm Convention, it is necessary that the authorized institutions in BiH, FBiH, RS and BD prepare amendments to existing laws and bylaws or adopt new legal acts regulating the management of PBDEs in BiH:

- Considering that in FBiH and BD, the Law on Chemicals and the regulations that restrict or prohibit the production, import, trade and use of certain chemicals, including PBDEs, have not been adopted yet, the competent institutions in FBiH and BD, primarily the Federal Ministry of Health in collaboration with the Federal Ministry of Environment and Tourism (in FBiH) and the Government of Brcko District should draft and adopt these regulations which will be harmonized with the legislation that is in force in the EU (such as Directive 2003/11/EC which regulates the marketing and use of products containing commercial pentaBDE and commercial octaBDE and Directive 2011/65/EC on the restriction of hazardous substances in EEE and Commission Regulation (EU) No 757/2010 on POPs);
- The existing Laws on Waste Management in FBiH, RS and BD require the competent ministries, the Federal Ministry of Environment (FBiH), the Ministry of Physical Planning, Civil Engineering and Ecology (RS) and BD Government to draft the regulation on management of special wastes. So far the Regulation on Waste Electrical and Electronic Equipment has only been drafted in FBiH. The Ministry of Physical Planning, Civil Engineering and Ecology (RS) and BD Government should draft and adopt such a regulation, in compliance with the Directive 2012/19/EU on WEEE. Furthermore, these competent ministries should adopt regulations on the management of ELVs in compliance with the Directive 2000/53/EC on ELVs;
- The ministries at entity level responsible for environmental protection (FMET, MPPCEE) and health (FMH, MHSW) and BD Government should harmonize existing or adopt new regulations relating to monitoring amounts of maximum permissible concentrations of PBDEs in electrical and electronic products in compliance with the Directive 2011/65/EU which regulates that the maximum concentrations of PBDEs by weight in all homogeneous materials in the EEE must not exceed 0.1%.

This restriction does not apply to products that were placed on the market before 1 July 2006, provided that reuse takes place in auditable closed loop return systems, and that the reuse of parts is notified to the consumer;

- The existing Laws on Waste Management in FBiH, RS and BD require the competent ministries of environmental protection in FBiH and RS, and the Department for Spatial Planning and Property Affairs of BD to draft regulations which will define the disposal procedures for special waste categories which includes ELVs. For the implementation of the Stockholm Convention, it is necessary that the aforementioned competent institutions in FBiH, RS and BD adopt regulations regulating the management of ELVs which will be harmonized with the Directive 2000/53/EC.

### **Main Objective 2: Strengthening technical capacity for collecting, organizing, structuring and processing data on PBDEs in BiH, including the establishment and coordination of information systems in FBiH, RS and BD, and improve the exchange of information between the competent institutions**

Specific Objective 2.1 Established and made operational information systems for management of chemicals, including PBDEs, in FBiH, RS and BD

In order to meet the provisions of the Stockholm Convention relating to the control measures for chemicals listed under the Convention and reporting to the Secretariat of the Convention and in order to ensure adequate management of products that potentially contain PFOS, the Ministry of Foreign Trade and Economic Relations should coordinate the setting up and harmonization of a database containing information on POPs chemicals (including PBDEs) with existing databases such as the database of chemicals in RS, the PRTR and the database of the Basel Convention. For this activity, the competent ministries are ministries of health and environment: the Federal Ministry of Health, Ministry of Health and Social Welfare of RS and the competent department of BD Government, Federal Ministry of Environment and Tourism, Ministry of Physical Planning, Civil Engineering and Ecology of RS and the competent department of BD Government.

In accordance with the “*Guidance for the control of the import and export of POPs*” (UNIDO 2012), databases are an important tool for implementing the requirements of the Stockholm Convention, primarily for the ITA - Customs Sector because they allow control of import for items that may contain PBDEs (tetrabromodiphenyl ether or hexabromodiphenyl ether and ether heptabromodiphenyl).

Although the production of industrial chemicals of the common name of PBDEs has been banned, due to the import of products treated with these chemicals prior to the ban on their use (2004), and imports of products made from recycled materials that may contain PBDEs, a certain amount of PBDEs are still imported into BiH, without any means of their registering under current practices of customs control.

In order to improve control of import of products that may contain PFOS, MoFTER should coordinate the development of a database for PBDEs (which will be joint with the PFOS database) with ITA.

This database should contain the following information on PBDEs:

- common name
- chemical name
- CAS names
- HS code of chemical or mixture
- UN number
- trade names
- names of manufacturing companies
- details of classification and labelling
- GHS concentration limits
- control measures in accordance with the Stockholm Convention

Thus, when importing goods, the Customs Sector should control the declaration of the product and if it determines that the product has the features listed in the database as a product which may contain PBDEs, this product should not be allowed import in BiH. Also, the Customs Sector should conduct periodic testing of products that are recognized as the most significant source of PBDEs (electronic equipment and vehicles manufactured before 2005) using equipment for rapid detection of bromine presence (such as “*sliding spark spectroscopy*”) that will indicate the presence of PBDEs in this product.

This database should be compatible with existing databases (Customs Tariff) applied by the ITA, primarily to facilitate the detection of problematic electronic products that might be imported in BiH, which will be further enhanced after the ITA improves its database so that the second hand electronic and electrical equipment is allocated a separate number within the Customs Tariff.

This database will also facilitate registration of vehicles that have reached the end of life, and which were manufactured before 2005, according to the principle of following the course of the import of this product until the moment it becomes waste. Therefore, the compatibility between databases for ELV which should be managed by IDDEA and database of PBDEs should be a significant control mechanism for used vehicles.

In addition, the Agency for Identification Documents, Registers and Data Exchange of Bosnia and Herzegovina (IDDEEA) should improve the existing database of records of registered vehicles to include the origin as an additional element of existing databases they currently manage in order to facilitate the identification of vehicles that potentially contain PBDEs<sup>171</sup>.

The manufacturers and importers of EEE should consider introducing, based on applicable laws, a system of material composition declaration for EEE, in order to report the presence of problematic substances in EEE to entity inspection bodies. This voluntary system could be an intermediate step in facilitating registration and identification of products that may contain PBDEs before BiH fully transposes all legal obligations arising from EU legislation.

With the aim of identifying processes, products and wastes containing PBDEs, all signatory parties of the Stockholm Convention should prepare a detailed inventory of these substances, i.e. periodic revision and update of National Implementation Plans so as to report to

<sup>171</sup> About 90% of the total amount of c-pentaBDE has been used in the United States/ North America („Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants .,)(UNIDO 2012)

the Secretariat of the Convention in accordance with Article 15. Due to the fact that the inventory developed within the project “Enabling Activities to Facilitate Early Action on the Implementation of the Stockholm Convention on Persistent Organic Pollutants in BiH” is a preliminary inventory developed within the duration of the project and the available financial resources and verified available data, MoFTER should coordinate its updating in the following period.

During the next review of the National Implementation Plan on POPs, the ministries responsible for environmental protection in FBiH and RS (in cooperation with the ministries responsible for energy, mining and industry), the Department for Spatial Planning and Property Affairs of BD, in collaboration with the Ministry of Foreign Trade and Economic Relations of BiH, which would coordinate the preparation of inventories between entities, should develop a detailed inventory of PBDEs in the country.

Specific Objective 2.2 Established and made operational information systems for hazardous waste management in FBiH, RS and BD, including PBDEs

The institution in charge of the WEEE management system should develop a database of WEEE in order to determine the problematic products that fall under special waste and to ensure their environmentally sound disposal. Such a system already exists in FBiH through an authorized operator of WEEE, “ZEOS eko-sistem” which already has established a database that must be kept in order to fulfil obligations under the Register of parties subject to payment of fees for electric and electronic waste of the Environmental Protection Fund FBiH, and so it is necessary that the Ministry of Physical Planning, Civil Engineering and Ecology of RS and BD Government authorize an operator of WEEE who will be responsible for the collection and treatment of WEEE in compliance with the legal provisions for this type of waste.

Given that PBDEs fall under one of the 86 chemicals on the list of pollutants of the Protocol on Pollutant Release and Transfer Registers to the Convention on Access to Information, Public Participation in Decision-making and Access to Justice in Environmental Matters, to which BiH is party, it is necessary to consider the possibility that the database of WEEE becomes a part of the existing registers of facilities and pollution.

The legal basis for establishing a Register of Plants and Pollution is the *Law on Environmental Protection* (Official Gazette of FBiH, no. 33/03) pursuant to which the *Regulation on the Register of Plants and Pollution* (Off. Gazette of FBiH, no. 82/07) was adopted. In RS, the *Regulation on the methodology and manner of keeping a register of plants and pollution* (Off. Gazette of RS no. 92/07) has been adopted. The Regulation creates a legal basis which defines the contents of the register. In the Brcko District the Regulation on the Register of Plants and Pollution has not been adopted yet, which is under the responsibility of BD Government.

### **Main Objective 3: Ensuring an adequate hazardous waste management system (with a focus on waste containing PBDEs)**

Specific Objective 3.1 Established, harmonized and made operational systems of management of special waste categories that relate to waste containing EEE and waste vehicles

The development of an operational legal framework for the management of POPs is a prerequisite for the establishment and strengthening of operational management system for special waste. The Federal Administration for Inspection Affairs, Inspectorate of Republika Srpska, Inspectorate of BD Government should strengthen monitoring of landfills in order to comply with the provisions of the entity Laws on Waste Management which prohibit the disposal of special wastes such as ELVs and WEEE along with municipal waste and at illegal waste disposal sites, which is still a common practice<sup>172</sup> throughout BiH.

Given that Bosnia and Herzegovina does not have the installations for the environmentally sound processing of waste containing PBDEs or the financial capability for their construction, in order to ensure proper management of special waste which may contain ELVs and WEEE, the entity ministries responsible for the environment should develop WEEE and ELV Management Plans which will define the most acceptable options for management of these categories of waste in compliance with “*Guidance on best available techniques and best environmental practices for the recycling and disposal of articles containing polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants*” (UNIDO, 2012) and in accordance with the economic capabilities of BiH.

<sup>172</sup> In accordance with the State of Environment Report in BiH 2012 (MoFTER, 2012)

According to the report *Cement Kilns firing Hazardous Waste - Draft 15 April 2006*<sup>173</sup>, it is not permitted to burn waste electrical and electronic equipment in cement kilns.

Specific Objective 3.2 Strengthened control mechanism of management of special categories of waste, especially in areas where system operators have the leading role (e.g. waste from EEE)

This objective is linked to the *Specific Objective 2.2.* which describes the need for establishing a system operator for managing electrical and electronic waste in Republika Srpska and Brcko District and developing management plans for special waste.

The Federal Ministry of Environment and Tourism, the Ministry of Physical Planning, Civil Engineering and Ecology of RS and the BD Government should initiate the implementation of pilot projects in order to justify the establishment of authorized collection centres for ELVs, i.e. in order to devise an appropriate model for BiH.

As the focal point for the implementation of Stockholm Convention, The Ministry of Foreign Trade and Economic Relations of BiH should, in collaboration with the entity ministries responsible for environmental protection and BD Government, initiate procurement and determine models for financing the adequate equipment for the rapid detection of the presence of PBDEs in WEEE and ELVs, so that inspection bodies can analyze “problematic”<sup>173</sup> products on PBDEs presence. For this purpose, the Ministry of Foreign Trade and Economic Relations may apply for funding within the financial assistance to developing countries for the implementation of the Stockholm Convention, in accordance with the Decision SC-5/22<sup>174</sup> of the Secretariat of the Stockholm Convention and Article 13 of the Stockholm Convention.

*Table 172:*  
*Action Plan 3.3.5:*  
*Production, import and*  
*export, use, stockpiles*  
*and wastes of hexaBDE*  
*and heptaBDE (Annex A,*  
*Part IV) and tetraBDE*  
*and pentaBDE (Annex A,*  
*Part V) and HBB, where*  
*applicable (Annex A,*  
*Part I)*

Action Plan 3.3.5: Production, import and export, use, stockpiles and wastes of hexaBDE and heptaBDE (Annex A, Part IV) and tetraBDE and pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I)		
Objectives	Activities	Time frame
<b>Main Objective 1: Improving the legal framework for the management of PBDEs</b>		
<b>Specific Objective 1.1</b> Legislation ensuring the fulfilment of all commitments related to PBDEs from the Stockholm Convention is prepared/changed/updated and adopted at BiH, FBIH, RS and BD	<b>Activity 1.1.1.</b> Develop and adopt a bylaw (regulation) governing the placing on the market of products containing commercial PentaBDE (c-PentaBDE) in accordance with Directive 2003/11 / EC	2016
	<b>Activity 1.1.2</b> Develop and adopt a bylaw (regulation) governing the placing on the market of products containing commercial OctaBDE (c- OctaBDE) in accordance with Directive 2003/11 / EC	2016
	<b>Activity 1.1.3</b> In RS and BD develop and the regulation on the management of waste from electrical and electronic products harmonized with the same in the Federation and with the Directive 2002/96/EC, and compliant with the new Directive 2012/19/EC, which entered into force on 14 February 2014	2016
	<b>Activity 1.1.4</b> In FBIH harmonize the <i>Regulation on Management of Waste from Electrical and Electronic Products</i> with the new Directive 2012/19/EC, which entered into force on 14 February 2014	2016
	<b>Activity 1.1.5</b> In Entities and BD, prepare and adopt an regulation governing the obligation to register end-of life vehicles (ELVs) in accordance with Directive 2000/53/EC on ELVs, and incorporate in the <i>Regulation on Vehicle Registration</i> (Official Gazette of BiH, No. 69 / 09) an obligation to have ELV vehicles registered in IDDEEA database	2016
	<b>Activity 1.1.6</b> In legislation dealing with waste management, insert obligation to incorporate BAT/BEP approaches to recycling and managing end-of lifecycle products, which are a significant source of POPs PBDEs (furniture, insulation foam, vehicles and EEE)	2016-2017

<sup>173</sup> [http://www.google.ba/url?sa=t&rc=1&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CDUQFjAB&url=http%3A%2F%2Fwww.pops.int%2Fdocuments%2Fbatbep\\_advance%2Fintersessional\\_work%2FBook%25206%2520Cement%2520Kilns.doc&ei=iG\\_CU4SvNsuM4gSKvoHoBg&usq=AFQjCNGnPy5DeYo\\_CKObKp-U5X\\_8VtYcUQ&bvm=bv.70810081,d.bGE](http://www.google.ba/url?sa=t&rc=1&q=&esrc=s&source=web&cd=2&cad=rja&uact=8&ved=0CDUQFjAB&url=http%3A%2F%2Fwww.pops.int%2Fdocuments%2Fbatbep_advance%2Fintersessional_work%2FBook%25206%2520Cement%2520Kilns.doc&ei=iG_CU4SvNsuM4gSKvoHoBg&usq=AFQjCNGnPy5DeYo_CKObKp-U5X_8VtYcUQ&bvm=bv.70810081,d.bGE)

<sup>174</sup> The term “problematic” implies the products produced before the production of PBDEs ceased, as stated in the Guidance on best available techniques and best environmental practices for the recycling and disposal of articles containing polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants.

<sup>175</sup> <http://chm.pops.int/Implementation/FinancialMechanism/FinancialNeedsAssessment>

#### Main Objective4: Improving institutional framework for management of PBDEs

Specific Objective 4.1 Strengthened capacities for amendment and effective implementation of the adopted legislation through training and education of relevant staff

As one of the basic measures for strengthening technical capacity in order to create the conditions for the implementation of the Stockholm Convention, is strengthening inspectional supervision at entity level in terms of controlling the products placed on the market that are potential sources of PBDEs, as well as strengthening the capacity of the Customs Sector of Indirect Taxation Authority of BiH concerning the import of used equipment which is a potential source of PBDEs. This involves training of staff of entity inspectorates and Customs Sector of ITA in the use of equipment for the rapid detection of the presence of PBDEs in products. These activities should be implemented by the competent inspection in FBiH, RS and BD, i.e. ITA for training customs officers, in cooperation with MoFTER.

Specific Objective 4.2 Advanced and strengthened inspection

Inspectorates of entities and BD should intensify inspection of equipment that is in trade, primarily second-hand electrical and electronic equipment, in cooperation with the customs authorities in order to ensure traceability of this equipment during its life cycle. Furthermore, the ITA – Customs Sector should intensify control over import of second-hand vehicles (manufactured before 2004) in order to reduce the number of vehicles that potentially contain PBDEs.

The Action Plan for the management of PBDEs (Table 172) contains a description of the measures and activities to be implemented in order to meet all the obligations of the Stockholm Convention in BiH, defines the institutions responsible for their implementation, as well as a timetable and the estimated financial resources.

Competent institution/organization	Stakeholders	Estimated financial resources
BiH: - FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH:5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
BiH: - FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH:5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
BiH: - FBiH:- RS:MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget RS: 5,000 BAM BD: 5,000 BAM
BiH: - FBiH: FMET RS:- BD:-	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH:2,000 BAM
BiH: Ministry of Communications and Transport in cooperation with MoFTER FBiH: FMET in cooperation with Ministry of Internal Affairs RS: MPPCEE in cooperation with Ministry of Internal Affairs BD: DSPPA in cooperation with Police of BD	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH:5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
BiH: - FBiH: FMET RS: MPPCEE BD: DSPPA	Authorized system operator for special waste categories	Regular activities within the budget

Action Plan 3.3.5: Production, import and export, use, stockpiles and wastes of hexaBDE and heptaBDE (Annex A, Part IV) and tetraBDE and pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I)		
Objectives	Activities	Time frame
	<b>Activity 1.1.7</b> Align or prepare and adopt legislation harmonized with the Directive 2011/65 / EC ("RoHS 2 Directive") on the restriction of hazardous substances in EEE. The development of this legislation is underway in RS	2015
	<b>Activity 1.1.8</b> In the Entities, adopt legislation governing the management of waste from ELVs in accordance with Directive 2000/53 / EC	2016
<b>Main Objective 2: Strengthening technical capacity for collecting, organizing, structuring and processing data on PBDEs in BiH, including the establishment and coordination of information systems in FBiH, RS and BD, and improve the exchange of information between the competent institutions</b>		
<b>Specific Objective 2.1</b> Established and made operational information systems for management of chemicals, including PBDEs, in FBiH, RS and BD	<b>Activity 2.1.1</b> Create new or update existing database that will contain information on PBDEs <i>If it is not technically feasible for the PBDEs database to be part of an existing database, because of data to be contained, it is necessary to establish a separate database.</i>	2017 -2023
	<b>Activity 2.1.2</b> Establish a data register, which will contain information about imported, registered and end-of life vehicles per country of origin and year of production - introduce origin as an additional element in the existing database and link it with a database on POPs	2017 – 2023
	<b>Activity 2.1.3</b> Establish a data register, which will contain information about imported, registered and end-of life vehicles per country of origin and year of production - introduce origin <sup>176</sup> as an additional element in the existing database and link it with a database on POPs	2016-2017
	<b>Activity 2.1.4</b> Introduce a voluntary system of composition declaration for EEE (such as Joint Industry Guide) <sup>177</sup> which would contribute to compliance with the legislation on EEE management. In accordance with this system, suppliers are obliged to report the presence of problematic materials and substances. The specific objective is to provide consistent and standardized declaration to entire supply chain in the production of EEE	2018
	<b>Activity 2.1.5</b> Develop a detailed inventory of PBDEs, which covers the entire lifecycle of these substances in BiH, based on the guidelines of UNIDO and during the next review of the NIP	2019
<b>Specific Objective 2.2</b> Established and made operational information systems for hazardous waste management in FBiH, RS and BD, including PBDEs	<b>Activity 2.2.1</b> In accordance with the existing legal and institutional set up (at entity level), create a database on waste EEE according to year of manufacture and origin, at the level of system operators and link it with databases of POPs and registers of plants and pollution. <i>If it is not technically feasible for the WEEE database to be part of an existing database, because of data to be contained, it is necessary to establish a separate database.</i>	2017-2023
	<b>Activity 2.2.2</b> Link the database of ELV, led by IDDEEA, with existing databases that will contain information on POPs and databases that are kept as part of the implementation of the Basel and Rotterdam Convention in BiH	2017
	<b>Activity 2.2.3</b> Introduce and implement systems for rapid detection of the presence of PBDEs in second hand imported EEE, furniture and vehicles (e.g. "sliding spark spectroscopy" technology)	After the adoption of the Law on Chemicals in FBiH and BD and relevant subordinate legislation
<b>Main Objective 3: Ensuring an adequate hazardous waste management system (with a focus on waste containing PBDEs)</b>		
<b>Specific Objective 3.1</b> Established, harmonized and made operational systems of management of special waste categories that relate to waste containing EEE and waste vehicles	<b>Activity 3.1.1</b> Ensure implementation of provisions of the legislation (laws on waste management in the FBiH, RS and BD) which prohibits disposal of hazardous waste with municipal waste at municipal landfills	2015

<sup>176</sup> Vehicles manufactured before 2004 and EEE produced before 2005 may contain PBDEs (Guidance on best available techniques and best environmental practices for the recycling and disposal of articles containing polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants, UNIDO 2012)

<sup>177</sup> In accordance with Labelling of products or articles that contain POPs – Initial considerations, UNIDO 2012

	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: - FBiH: FMH and FMET RS: MIEM BD: DSPPA, DHOS	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH:5,000 BAM RS: 1,000 BAM BD: 5,000 BAM
	BiH: FBiH: FMET in cooperation with Ministry of Internal Affairs FBiH RS: MPPCEE in cooperation with Ministry of Internal Affairs RS BD: Government of BD in cooperation with Police of BD	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH:5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
	BiH: MoFTER (coordination) FBiH: FMH RS: MHSW BD: DHOS	Other competent state and entity ministries and departments of the BD Government; Inspectorates in FBiH, RS and BD	Regular activities within the budget FBiH: 24,000 BAM (4,000 BAM/year) RS: 18,000 BAM (3,000 BAM/year) BD: 6,000 BAM (1,000 BAM/year) The cited funds are necessary for the recruitment of expert national consultant
	BiH: IDDEEA FBiH: Ministry of Internal Affairs FBiH RS: Ministry of Internal Affairs RS BD: Police of BD	Other competent state and entity ministries and departments of the BD Government; Inspectorates in FBiH, RS and BD; ITA	Regular activities within the budget FBiH: 12,000 BAM (2,000 BAM/year) RS: 12,000 BAM (2,000 BAM/year) BD: 6,000 BAM (1,000 BAM/year) The cited funds are necessary for the recruitment of expert national consultant
	BiH: ITA in cooperation with: FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; Inspectorates in FBiH, RS and BD	Regular activities within the budget
	Manufacturers and importers of EEE	Other competent state and entity ministries and departments of the BD Government; Inspectorates in FBiH, RS and BD	FBiH: 5,000 BAM RS: 5,000 BAM BD: 1,000 BAM The cited funds are necessary for maintenance of database
	BiH: MoFTER (coordination) FBiH: FMET in cooperation with FMH RS: MPPCEE in cooperation with MHSW BD: DSPPA, DHOS	Other competent state and entity ministries and departments of the BD Government	FBiH: 50,000 BAM RS: 50,000 BAM BD: 10,000 BAM which should be ensured through international financing programmes
	BiH: MoFTER FBiH: FMET RS: Fund for Environmental Protection and Energy Efficiency of RS BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; Inspectorates in FBiH, RS and BD, Environmental Protection Fund of FBiH, Government of BD (until establishment of Environmental Protection Fund)	Regular activities within the budget FBiH: 12,000 BAM (2,000 BAM/year) RS: 12,000 BAM (2,000 BAM/year) BD: 6,000 BAM (1,000 BAM/year) The cited funds are necessary for the recruitment of expert consultant
	BiH: MoFTER/ IDDEEA FBiH: FMET RS: MPPCEE BD: DSPPA	NFP for the implementation of the Stockholm, Basel and Rotterdam Convention in BiH	Regular activities within the budget
	BiH: ITA in cooperation with MoFTER FBiH:- RS:- BD:-	ITA – Customs control, Authorized system operators for special waste categories, importers of EEE and used vehicles	BiH:75,000 BAM The cited funds are necessary for the recruitment of expert consultants with the provision of equipment for field sampling and analysis The funds may be secured from international sources/ funds (through grants, projects, etc.)
	BiH: - FBiH: FAII RS: RAlA BD: Inspectorate of BD Government	FMET, MPPCEE, DSPPA	Regular activities within the budget

Action Plan 3.3.5: Production, import and export, use, stockpiles and wastes of hexaBDE and heptaBDE (Annex A, Part IV) and tetraBDE and pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I)		
Objectives	Activities	Time frame
	<b>Activity 3.1.2</b> Develop waste management plans containing PBDEs (WEEE, ELV, furniture) at the level of entities and cantons (in FBiH) while respecting the principles of the existing environmental protection and waste management strategies	2016
	<b>Activity 3.1.3</b> Safe final disposal of equipment containing PBDEs in accordance with legal provisions in force	2017-2023
<b>Specific Objective 3.2</b> Strengthened control mechanism of management of special categories of waste, especially in areas where system operators have the leading role (e.g. waste from EEE)	<b>Activity 3.2.1</b> In RS and BD establish a system operator for managing electrical and electronic waste that will coordinate its activities with the operator of the system in FBiH, and exchange data to ensure effective management of the systems	2017
	<b>Activity 3.2.2</b> Implement a pilot project in selected car scrap yards in order to verify the introduction of the concept mentioned in Activity 3.2.3 at the state level, or to examine the appropriate model for BiH	2017-2018
	<b>Activity 3.2.3</b> Establish authorized centres for the disposal of ELVs in accordance with the "Guidelines for the Best Available Techniques and best practices for environmental recycling and disposal of products containing polybrominated diphenyl ethers (PBDEs)" and maintain databases on the amounts of separated polymers containing PBDEs in accordance with Regulations on Waste Categories with Lists in FBiH, RS and BD	Pending successful implementation of Activity 3.2.2.
	<b>Activity 3.2.4</b> Procure adequate equipment for the rapid detection of the presence of PBDEs in WEEE, ELV and furniture <sup>179</sup> .	2017
<b>Main Objective 4: Improving institutional framework for management of PBDEs</b>		
<b>Specific Objective 4.1.</b> Strengthened capacities for amendment and effective implementation of the adopted legislation through training and education of relevant staff	<b>Activity 4.1.1</b> Educate staff to use equipment under Activity 2.2.3	2017
	<b>Activity 4.1.2</b> Prepare the report on equipment and waste containing PBDEs (elaborated under Action Plan 3.3.17: Reporting)	Every 4 years
<b>Specific Objective 4.2</b> Advanced and strengthened inspection	<b>Activity 4.2.1</b> Educate staff of inspection bodies in FBiH, RS and BD on equipment on market that may contain PBDEs (WEEE, ELV, furniture, polyurethane foam, etc.)	2017
	<b>Activity 4.2.2.</b> Increase inspection in terms of registering equipment containing PBDEs to market inspection and other relevant institutions	2016-2017
<b>Expected commencement of implementation of the action plan</b>		
Duration of the implementation of the action plan		
Total estimated financial resources		

\* Does not include the cost of establishing authorized operators for WEEE in RS and BD which is estimated at 750,000 BAM per entity.



	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: FBiH: FMET and cantonal environmental ministries RS: MPPCEE BD: DSPPA	System operators, entity and BD inspectorates	Regular activities within the budget and recruitment of expert consultants - FBiH: 25,000 BAM RS: 20,000 BAM BD: 15,000 BAM
	BiH: MoFTER FBiH: FMET RS: MPPCEE BD: DSPPA Owners of equipment and waste containing PBDEs Operators licensed for disposal of hazardous waste	Other competent state and entity ministries and departments of the BD Government; Operators licensed for the disposal of hazardous waste; Inspectorates in FBiH, RS and BD	The necessary funds will be determined after the finalization of Activity 3.1.2.
	BiH: FBiH: FMET RS: MPPCEE BD: DSPPA	System operators	RS:750,000 BAM BD: 750,000 BAM <sup>178</sup> Funds may be secured from the budgets or from international sources /funds (through grants, projects, etc.)
	BiH: - FBiH: FMET RS: MPPCEE BD: DSPPA	Authorized system operators for special waste categories, Inspectorates in FBiH, RS and BD	Funding will have to be provided through international donations or projects, for example. GEF
	BiH: FBiH: FMET RS: MPPCEE BD: Government of BD	Authorized ELV disposal centres, Inspectorates in FBiH, RS and BD	It is not possible to determine the cost for implementing this activity at this stage. Funds may be secured from the budgets or from international sources /funds (through grants, projects, etc.)
	BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: Government of BD	ITA, FAIL, RAIA, Inspectorate of BD Government and authorized ELV and WEEE disposal centres	It is not possible to determine the cost for implementing this activity at this stage. Funds may be secured from international sources /funds (through grants, projects, etc.)
	BiH: ITA – Customs sector FBiH: RS: BD:	Authorized system operators for special waste categories (WEE and ELV) Inspectorates in FBiH, RS and BD	BiH – 30,000 BAM The cited funds are necessary for the recruitment of expert national and international consultants and training organization. Funds may be secured from the budgets or from international sources / funds (through grants, projects, etc.)
	BiH: MoFTER in cooperation with FMET, MPPCEE, DSPPA	Entity ministries and department of BD Government responsible for healthcare; Inspectorates in FBiH, RS and BD	Regular activities within the budget BiH: 10,000 BAM The cited funds are necessary for the recruitment of expert consultants - if needed
	BiH: FBiH: FAIL RS: RAIA BD: Inspectorate of BD Government	Other competent ministries	FBiH: 30,000 BAM RS: 30,000 BAM BD: 10,000 BAM The cited funds are necessary for the recruitment of expert national and international consultants and training organization. Funds may be secured from the budgets or from international sources /funds.
	BiH: FBiH: FAIL RS: RAIA BD: Inspectorate of BD Government	Other competent ministries, Retailers of used EEE, vehicles and furniture Owners WEEE and ELV	Regular activities within the budget
<b>Upon the adoption of the National Implementation Plan</b>			
2015 - 2023			
557,000 BAM * (BiH: 115,000 BAM, FBiH: 185,000 BAM, RS: 173,000 BAM, BD: 84,000 BAM)			

<sup>178</sup> Estimated on the basis of Article 13 of the Regulation on waste management from electrical and electronic products of FBiH

<sup>179</sup> „Guidance on best available techniques and best environmental practices for the recycling and disposal of articles containing polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants” (UNIDO, 2012)

### 3.3.6 ACTION PLAN: PRODUCTION, IMPORT AND EXPORT, USE, STOCKPILES AND WASTES OF DDT (ANNEX B) IF USED IN THE COUNTRY

This action plan was not elaborated separately, as it is contained in the *Action Plan 3.3.3: Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)*.

### 3.3.7 ACTION PLAN: PRODUCTION, IMPORT AND EXPORT, USE, STOCKPILES AND WASTES OF PFOS, ITS SALTS AND PFOSF (ANNEX B, PART III)

#### 3.3.7.1 Objectives of PBDEs management

The main objective of this Action Plan is to reduce and gradually eliminate the use of PFOS and equipment containing or contaminated with PFOS, prevent releases of PFOS into the environment, and ensure adequate conditions for the disposal of PFOS wastes in an environmentally sound manner.

Table 173 provides an overview of the main and specific objectives for PFOS management which need to be achieved in order to ensure the implementation of the Stockholm Convention in BiH.

*Table 173:  
Main and specific  
objectives of PFOS  
management*

PFOS management - Priorities and objectives
<p><b>Main Objective 1: Improving or creating an adequate legal framework for all aspects of PFOS management</b></p> <p>Specific Objectives:</p> <ol style="list-style-type: none"> <li>1. Legislation, ensuring the fulfilment of all obligations under the Stockholm Convention relating to PFOS, is drafted/changed/updated and adopted at the level of BiH, FBiH, RS and BD</li> </ol>
<p><b>Main Objective 2: Strengthening technical capacity for collecting, organizing, structuring and processing data on POPs in BiH</b></p> <p>Specific Objectives:</p> <ol style="list-style-type: none"> <li>1. Established and made operational information systems for management of PFOS chemicals in FBiH, RS and BD, in accordance with best practice experiences of EU countries</li> </ol>
<p><b>Main Objective 3: Ensuring an adequate hazardous waste management system (with a focus on waste containing PFOS)</b></p> <p>Specific Objectives:</p> <ol style="list-style-type: none"> <li>1. Adopted/harmonized regulations in FBiH, RS and BD, defining special categories of waste management, including waste containing PFOS</li> <li>2. Established, harmonized and made operational management systems for special categories of waste, including waste containing PFOS</li> </ol>
<p><b>Main Objective 4: Improving the institutional framework for all aspects of PFOS</b></p> <p>Specific Objectives:</p> <ol style="list-style-type: none"> <li>1. Strengthened capacities for change and effective implementation of the adopted legislation through training and education of relevant staff</li> <li>2. Established comprehensive systems / management mechanisms of PFOS in BiH, FBiH, RS and BD</li> </ol>
<p><b>Main Objective 5: Education and raising awareness of the public and target groups</b></p> <p>Specific Objectives:</p> <ol style="list-style-type: none"> <li>1. Undertake activities to educate and raise awareness among target groups (decision-makers, the public, industry) on obligations under the Convention on the issue of PFOS</li> </ol>

#### 3.3.7.2 Planned activities and measures for PFOS management

The implications of the implementation of the Stockholm Convention in terms of “new” chemicals including PFOS, include:

- Taking control measures for each chemical listed under the Stockholm Convention (Article 3 and 4);
- Developing an inventory of chemicals in stockpiles (Article 6);
- Developing and updating the National Implementation Plan (Article 7);
- Inclusion of “new” chemicals (including PFOS) in reporting (Article 15);
- Inclusion of “new” chemicals (including PFOS) in the programme to support effectiveness evaluation (Article 16).

For the successful implementation of all obligations under the Stockholm Convention in BiH, the Action Plan for management of PFOS has identified necessary measures and activities that need to be undertaken in accordance with the defined priorities and goals.

**Main Objective 1: Improving or creating an adequate legal framework for all aspects of PFOS management**

Specific objective 1.1 Legislation, ensuring the fulfilment of all obligations under the Stockholm Convention relating to PFOS, is drafted/changed/updated and adopted at the level of BiH, FBiH, RS and BD

The obligation to draft laws and regulations that will be in accordance with the legislation in force in the EU, such as Regulation (EC) No. 1907/2006 ("REACH" Regulation) is listed in the *Action Plan 3.3.1: Institutional and regulatory enhancement measures.*

In order to ensure monitoring of PFOS in products that are placed on the market and industrial processes which use PFOS, the regulations in FBiH, RS and BD governing the monitoring and the maximum permissible concentrations of PFOS in the environment, competent ministries in FBiH and RS responsible for environmental protection, water management, agriculture and health as well as the authorized departments of BD Government should draft and adopt new or amend existing legislation which will determine (or update existing) maximum permitted concentrations of PFOS in the environment, in line with the conclusions of the preliminary inventory. This activity has been elaborated within the *Action Plan 3.3.18: Research, development and monitoring.*

The Federal Ministry of Health and the Government of BD should adopt the Regulation on conditions for restricting and banning of manufacture, trade and use of chemicals which will include the chemicals listed under the Stockholm Convention and which will be in compliance with the Commission Regulation (EU) No 757/2010 on POPs. Such a regulation is already in force in Republika Srpska. The obligation of adopting this regulation is listed within the *Action Plan 3.3.1: Institutional and regulatory strengthening measures.* When bringing this regulation, the Federal Ministry of Health and the Government of BD should set the deadlines for eliminating use of products containing PFOS and define the specific exceptions. In Republika Srpska the use of products that were placed on the market before 15 October 2010 is permitted, whereas production and placement on the market is permitted only if the amount of these substances released into the environment is minimized and only for specific purposes:

- a. until August 26, 2015 for wetting agents in controlled electroplating processes,
- b. for photo resistant or antireflection coatings in photolithography processes,
- c. for photographic coatings applied to films, paper or printing plates,
- d. for mist suppressants in non-decorative chromium (VI) plating processes in closed systems,
- e. for aviation hydraulic fluids.

The maximum allowable concentrations of PFOS in products, processes and the environment should be harmonized with the values prescribed in the EU. In fact, the European Union practically banned the use of PFOS in finished and semi-finished products in 2006 by the EU Directive 2006/122/EC (maximum content of PFOS: 0.005% by weight). Use of PFOS for industrial applications (e.g. photolithography, mist suppressants for hard chromium plating, aviation hydraulic fluids) was exempted. In 2009 this Directive was incorporated into the Commission Regulation (EC) no. 552/2009 ("REACH" Regulation). In 2010 PFOS was added to the Regulation on Persistent Organic Pollutants (Commission Regulation (EU) No 757/2010) which amends the basic text of Regulation (EC) no. 850/2004 on persistent organic pollutants, and the limit value was lowered to max. 0.001% by weight (10 mg/kg).

In order to protect the workers who are occupationally exposed to PFOS (fire fighters, workers in the metallurgical industry, workers in the leather and textile industries), the Federal Ministry of Labour and Social Policy (in collaboration with the Federal Ministry of Health), Ministry of Labour, War Veterans and Disabled Persons Protection of RS and the Department of Health and Other Services of BD Government, should adopt regulations on occupational safety with chemicals containing PFOS, which will specify the cases in which it is permitted to use PFOS by implementing BAT/BEP and the inclusion of available alternatives where it is economically justified.

The following data are relevant in order to ensure proper handling of products and formulations containing PFOS:

- Information on basic chemicals and auxiliary agents from suppliers related to the proper storage and handling; environmental characteristics (COD, BOD<sub>5</sub>, aquatic toxicity, degree of decomposition/bio elimination, content of nitrogen, phosphorus, sulphur, adsorbed organic halogens, type and quantity of volatile organic compounds, emission factors, health and safety aspects).
- Information from suppliers regarding the types and characteristics of raw materials for the preparation of PFOS.
- Chemical and physical properties that need to be taken into account for proper handling.

### **Main objective 2: Strengthening technical capacity for collecting, organizing, structuring and processing data on POPs in BiH**

Specific objective 2.1 Established and made operational information systems for management of PFOS chemicals in FBiH, RS and BD, in accordance with best practice experiences of EU countries

In order to meet the provisions of the Stockholm Convention relating to the control measures for chemicals listed under the Convention and reporting to the Secretariat of the Convention and in order to ensure adequate management of products that potentially contain PFOS, the Ministry of Foreign Trade and Economic Relations should coordinate the setting up and harmonization of a database containing information on POPs chemicals (including PFOS) with existing databases such as the database of chemicals in RS, the PRTR and the database of the Basel Convention. For this activity, the competent ministries are ministries of health and environment: the Federal Ministry of Health, Ministry of Health and Social Welfare of RS and the competent department of BD Government, Federal Ministry of Environment and Tourism, Ministry of Physical Planning, Civil Engineering and Ecology of RS and the competent department of BD Government.

In order to improve control of import of products that may contain PFOS, MoFTER should coordinate the development of a database for PFOS (which will be joint with the PBDEs database) with the Indirect Taxation Authority - Customs Sector, as described within the specific objective 2.1 of *Action Plan 3.3.5: Production, import and export, use, stockpiles and wastes of hexaBDE and heptaBDE* (Chapter 3.3.5).

In addition, the information on alternatives to PFOS<sup>180</sup> should be continuously updated in accordance with new findings about the available and economically feasible alternatives and BAT/BEP and this information should be available on the website of the relevant ministries. This information should be periodically updated with coordination by MoFTER.

With the aim of identifying processes, products and wastes containing PFOS, all signatory parties of the Stockholm Convention should prepare a detailed inventory of these substances, i.e. periodic revision and update of National Implementation Plans so as to report to the Secretariat of the Convention in accordance with Article 15. Due to the fact that the inventory developed within the project "Enabling Activities to Facilitate Early Action on the Implementation of the Stockholm Convention on Persistent Organic Pollutants in BiH" is a preliminary inventory developed within the duration of the project and the available financial resources and verified available data, MoFTER should coordinate its updating in the following period.

The inventory of PFOS should record the information on amounts of fire-fighting foams - AFFF foams<sup>181</sup> that are in stock and quantities of new fire-fighting foam, location of use of fire-fighting foam, reason for their use (drill or fire) in order to allow a detailed insight into the amount of PFOS in this potential PFOS stream.

The data presented within the Preliminary Inventory of POPs substances must be verified and expanded in accordance with the recommendations of the Secretariat of the Convention, by using information from the database which should be the basis for developing an elaborate inventory, which in its current form is only the analysis of existing and available data. As the focal point for the implementation of the Stockholm Convention, MoFTER should initiate securing of financial resources from international programs for financial assistance to developing countries and other environmental programs (such as GEF).

<sup>180</sup> "Draft Guidance document on Alternatives to perfluorooctane sulfonic acid (PFOS) and its derivatives" (POPRC, 2010)

<sup>181</sup> Aqueous film forming foam (AFFF)

### Main objective 3: Ensuring an adequate hazardous waste management system (with a focus on waste containing PFOS)

Specific objective 3.1 Adopted/harmonized regulations in FBiH, RS and BD, defining special categories of waste management, including waste containing PFOS

Even though PFOS in electrical and electronic equipment are process chemicals and not part of the final product<sup>182</sup> (used in almost all manufacturing processes as surface-active chemicals), in accordance with the principles of waste management prescribed by the Laws on Waste Management in FBiH, RS and BD, WEEE should be considered in the context of PFOS management. In Republika Srpska and the Brcko District, the Ministry of Physical Planning, Civil Engineering and Ecology of RS and the BD Government should draft and adopt the Regulation on Waste Electrical and Electronic Products in compliance with the new WEEE Directive 2012/19/EU, whereas in FBiH the regulation already exists (harmonized with the WEEE Directive 2002/96/EC).

Specific objective 3.2 Established, harmonized and made operational management systems for special categories of waste, including waste containing PFOS

The Federal Ministry of Environment and Tourism, the Ministry of Physical Planning, Civil Engineering and Ecology of RS and the BD Government should develop management plans for special waste categories which will define the following, by applying BAT/BEP<sup>183</sup>:

- Pre-acceptance procedure;
- Acceptance procedures
- Sampling procedures
- Waste acceptance facilities for waste streams containing PFOS.

Based on the results of the preliminary inventory of PFOS in BiH, there are no data on environmentally sound management of PFOS wastes in BiH. In accordance with “*Guidelines on Best Available Techniques and Provisional Guidance on Best Environmental Practices for the use of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on POPs*” (hereinafter referred to as “BAT/BEP for PFOS”), irreversible destruction of waste with an unknown quantity of PFOS and related substances can be carried out at a minimum of 1100 °C. The “*Updated General Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with POPs*” (UNEP) state that incineration in cement kilns at temperatures above 1600 °C, as specified in the “*BAT/BEP for PFOS*”, is applicable to various types of POPs. The combustion process of POPs wastes in cement kilns is described in detail within 3.3.4. *Action Plan: Production, import and export, use, identification, labelling, removal, storage and disposal of polychlorinated biphenyls (PCBs) and equipment containing PCBs (Annex A, Part II)*.

However, considering that the “*Technical Guidelines for the Environmentally Sound Management of Wastes Consisting of, Containing or Contaminated with perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOSF)*” is still in the process of drafting within the Secretariat of the Basel Convention<sup>184</sup>, it is necessary that the Federal Ministry of Environment and Tourism (both cement plants in BiH are located on the territory of the Federation of BiH), in cooperation with independent experts in this field and the Ministry of Physical Planning, Civil Engineering and Ecology of RS, the BD Government and the Ministry of Foreign Trade and Economic Relations, as well as representatives of cement plants discuss the most appropriate solution for the final disposal of PFOS.

### Main objective 4: Improving the institutional framework for all aspects of PFOS

Specific objective 4.1 Strengthened capacities for change and effective implementation of the adopted legislation through training and education of relevant staff

In order to control imports of products containing PFOS to BiH, it is necessary that the Indirect Taxation Authority initiates training of staff of Customs Sector of the Indirect Taxation Authority in coordination with MoFTER. Training should include information about possible

<sup>182</sup> “Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants” (UNEP, 2012)

<sup>183</sup> “Guidelines on Best Available Techniques and Provisional Guidance on Best Environmental Practices for the use of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on POPs” (UNEP, 2012)

<sup>184</sup> “Progress report on the implementation of the programme of work for the development, review and updating of technical guidelines for the environmentally sound management of wastes consisting of, containing or contaminated with persistent organic pollutants”, 11th meeting of the Conference of the Parties to the Basel Convention, April – May 2013

applications of PFOS in products, the largest manufacturers of PFOS substances (China)<sup>185</sup> and the recording of “problematic” products. In addition, the inspectorates of FBiH, RS and BD should initiate training for inspectors on the use PFOS in widely used products, in coordination with MoFTER so as to record and initiate laboratory testing for the presence of PFOS in “problematic” products.

Specific objective 4.2 Established comprehensive systems / management mechanisms of PFOS in BiH, FBiH, RS and BD

The Federal Ministry of Environment and Tourism, the Ministry of Physical Planning, Civil Engineering and Ecology of RS and the BD Government should, in coordination with MoFTER, initiate the development of a strategy for gradual elimination of the use of PFOS with the application of BAT/BEP so that industries which use PFOS as surface-active chemicals (photography industry, semiconductor industry, non-decorative chroming) can draft the respective adaptation plans and meet the deadlines specified by the *Regulation on restrictions, ban and manufacture conditions, trade and use of chemicals* (see *Specific objective 1.2.*). At the same time competent entity ministries should, in cooperation with MoFTER, initiate the development of Plans for Gradual Transition to alternatives to PFOS with the use of BAT/BEP in accordance with the *“Draft Guidance document on Alternatives to perfluorooctane sulfonic acid (PFOS) and its derivatives”* (POPRC, 2010). These plans should include:

- The deadlines for replacing PFOS with safe alternatives,
- BAT/BEP for the use of PFOS until their elimination,
- Plan for replacement i.e. methods of disposal of waste and/or residues of PFOS,
- Description of the proposed alternatives.

Parties to the Convention are required to periodically (every four years) prepare a report on the implementation of the Stockholm Convention, and submit it to the Secretariat of the Convention. As part of this report and on the basis of data from the updated inventories (base), the Ministry of Foreign Trade and Economic Relations of BiH should prepare a report on progress in removal and disposal of equipment and waste containing PFOS in BiH, which will contain information on:

- amount of products containing PFOS;
- PFOS eliminated from use;
- amount of collected waste containing PFOS, and methods of its processing and final disposal (export).

*Table 174:*  
*Action Plan 3.3.7:*  
*Production, import and*  
*export, use, stockpiles*  
*and wastes of PFOS, its*  
*salts and PFOSF (Annex*  
*B, Part III)*

Action Plan 3.3.7: Production, import and export, use, stockpiles and wastes of PFOS, its salts and PFOSF (Annex B, Part III)		
Objectives	Activities	Time frame
<b>Main Objective 1: Improving or creating an adequate legal framework for all aspects of PFOS management</b>		
<b>Specific Objective 1.1.</b> Legislation, ensuring the fulfilment of all obligations under the Stockholm Convention relating to PFOS, is drafted/ changed/updated and adopted at the level of BiH, FBiH, RS and BD	<b>Activity 1.1.1.</b> Develop and adopt appropriate by-laws regulating the measures for safe and healthy work when exposed to chemical substances, carcinogens or mutagens. <i>Development of other laws and bylaws pertaining to all POPs chemicals, including PFOS is detailed in Action Plan 3.3.1: Institutional and regulatory strengthening measures</i>	2015- 2016
<b>Main Objective2: Strengthening technical capacity for collecting, organizing, structuring and processing data on POPs in BiH</b>		
<b>Specific Objective 2.1.</b> Established and made operational information systems for management of PFOS chemicals in FBiH, RS and BD, in accordance with best practice experiences of EU countries	<b>Activity 2.1.1</b> Develop new or update existing databases on chemicals with information on PFOS This activity is undertaken simultaneously with Activity 2.1.1. of Action plan 3.3.5	
	<b>Activity 2.1.3</b> Develop a detailed inventory of PFOS substances in BiH, including fire-fighting foam	2018-2019

<sup>185</sup> “Perfluorooctane Sulfonate (PFOS) Production and Use: Past and Current Evidence” (UNIDO, 2009)

The framework for reporting to the Secretariat of the Convention is shown in the *Action Plan 3.3.17: Reporting*.

#### Main objective 5: Education and raising awareness of the public and target groups

Specific objective 5.1 Undertake activities to educate and raise awareness among target groups (decision-makers, the public, industry) on obligations under the Convention on the issue of PFOS

In order for the industries to be able to develop plans listed under the *Specific objective 4.2*; it is necessary for MoFTER, in coordination with other competent ministries, to initiate training for persons responsible for technology and process management in some industries on best practices for the gradual elimination of the use of PFOS. For this purpose, the Ministry of Foreign Trade and Economic Relations may apply for funding within the financial assistance to developing countries for the implementation of the Stockholm Convention, in accordance with the Decision SC-5/22<sup>186</sup> of the Secretariat of the Stockholm Convention and Article 13 of the Stockholm Convention.

In addition, Civil Protection Administrations of FBIH, RS and BD, in collaboration with MoFTER and other competent ministries, should coordinate the implementation of training for the most significant users of products containing PFOS, such as members of professional fire brigades, employees at airports and large industrial facilities with fire suppression systems. The training should enable these users to contribute to the development of the database of fire-fighting foam (see *Specific objective 2.1*) in a way that they are able to:

- update the list of fixed and portable systems containing AFFF in order to determine the need for further use of these products,
- remove and properly dispose of equipment that is no longer needed (the age of the products and the possibility of replacing them with safer alternatives should be taken into account)
- implement BAT/BEP in order to prevent accidental releases into the environment and in case of accidental releases into the environment, define the measures and actions to prevent pollution.

It is also necessary that MoFTER participates in the coordination of training of importers and distributors of widely used products that may contain PFOS in order to avoid placing "problematic" products on the market.

Competent institution/organization	Stakeholders	Estimated financial resources
BIH: - FBIH: FMLSP RS: MLWVDPP BD: DHOS	Entity ministries responsible for healthcare; Departments and/or Institutes of Public Health in FBIH, RS and BD	Regular activities within the budget FBIH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
<i>This activity has been elaborated within Action plan 3.3.5: Production, import and export, use, stockpiles and wastes of HexaBDE and HeptaBDE</i>		
BIH: MoFTER (coordination) FBIH: FMET, Federal Administration of Civil Protection in cooperation with cantonal administrations of civil protection RS: MPPCEE, Republic Administration of Civil Protection of RS BD: DSPPA, Department of Public Safety of BD (Civil Protection service)	The Ministry of Security of BIH - Department for Strategic Planning and Protection and Rescue Measures and other competent state and entity ministries and departments of the BD Government; Inspectorates in FBIH, RS and BD	FBIH: 50,000 BAM RS: 50,000 BAM BD: 10,000 BAM

Action Plan 3.3.7: Production, import and export, use, stockpiles and wastes of PFOS, its salts and PFOSF (Annex B, Part III)		
Objectives	Activities	Time frame
<b>Main Objective 3: Ensuring an adequate hazardous waste management system (with a focus on waste containing PFOS)</b>		
Specific Objective 3.1. Adopted/harmonized regulations in FBiH, RS and BD, defining special categories of waste management, including waste containing PFOS	<b>Activity 3.1.1</b> In RS and BD, develop and adopt regulations on management of waste from electrical and electronic products harmonized with the new Directive 2012/19 / EU ("WEEE Directive"), which entered into force on 14 February 2014	2016
	Specific Objective 3.2. Established, harmonized and made operational management systems for special categories of waste, including waste containing PFOS	<b>Activity 3.2.1</b> Develop waste management plan for waste containing PFOS, including fire-fighting foam
<b>Activity 3.2.2</b> Safely dispose of equipment containing PFOS in accordance with the legal provisions in force		2017 -2023
<b>Main Objective 4: Improving the institutional framework for all aspects of PFOS</b>		
Specific Objective 4.1. Strengthened capacities for change and effective implementation of the adopted legislation through training and education of relevant staff	<b>Activity 4.1.1</b> Educate employees of ITA - Customs Sector <i>This activity may be undertaken simultaneously with activities of Action plan 3.3.5</i>	2017
	<b>Activity 4.1.2.</b> Educate employees of the entity and BD inspection authorities, in particular market markets, labor and environmental inspectors <i>This activity may be undertaken simultaneously with activities of Action plan 3.3.5</i>	2017
Specific Objective 4.2. Established comprehensive systems / management mechanisms of PFOS in BiH, FBiH, RS and BD	<b>Activity 4.2.1</b> Develop strategies for phasing-out of PFOS from use in the industries in which it is used (platinum coating, photolithography) with implementation of BAT/BEP	2018
	<b>Activity 4.2.2</b> Develop a plan for gradual transition to alternatives to PFOS, with implementation of BAT / BEP	2019
	<b>Activity 4.2.3</b> Draft report on products and waste containing PFOS	Every 4 years
<b>Main Objective 5: Education and raising awareness of the public and target groups</b>		
Specific Objective 5.1. Undertake activities to educate and raise awareness among target groups (decision-makers, the public, industry) on obligations under the Convention on the issue of PFOS	<b>Activity 5.1.1</b> Educate technologists in the industry on best practices to phase out the use of PFOS	2016
	<b>Activity 5.1.2</b> Educate primary users of products (fire-fighting foam) which may contain PFOS - fire brigades, emergency teams in large industrial plants, airports, etc.	2016
	<b>Activity 5.1.3</b> Educate importers and distributors of consumer products that may contain PFOS	2016
Expected commencement of implementation of the action plan		
Duration of the implementation of the action plan		
Total estimated financial resources		



	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: - FBIH:- RS:MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Necessary financial resources detailed in Action plan 3.3.5
	BiH: - FBIH: FMET RS:MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; Inspectorates in FBIH, RS and BD; Operators of waste management centres	Regular activities within the budget with the recruitment of specialized consultants FBIH: 25,000 BAM RS: 20,000 BAM BD: 15,000 BAM
	BiH: FBIH: FMET RS:MPPCEE BD: DSPPA	Inspectorates in FBIH, RS and BD; Operators of waste management centres	It is not possible to determine the cost for this activity pending the implementation of Activity 2.1.3. Obligation of the equipment owner
	BiH: ITA FBIH:- RS:- BD:-	MoFTER, Other competent state and entity ministries and departments of the BD Government;	Necessary financial resources detailed in Action plan 3.3.5
	BiH: - FBIH: Federal Administration for Inspection Affairs RS: Inspectorate of RS BD: Inspectorate of BD	Other competent state and entity ministries and departments of the BD Government;	Necessary financial resources for the training detailed in Action plan 3.3.5
	BiH: MoFTER (coordination) FBIH: FMET RS: MPPCEE BD: Government of BD	Other competent state and entity ministries and departments of the BD Government; Inspectorates in FBIH, RS and BD; Equipment owners; Operators licensed for the disposal of hazardous waste; Industries	Regular activities within the budget with the recruitment of specialized consultants FBIH: 25,000 BAM RS: 20,000 BAM BD: 15,000 BAM Funds may be secured from the budgets or from international sources /funds (through grants, projects, etc.)
	BiH: MoFTER (coordination) FBIH: FMET RS: MPPCEE BD:DSPPA	Other competent state and entity ministries and departments of the BD Government; Inspectorates in FBIH, RS and BD; Operators licensed for the disposal of hazardous waste; Industries	It is not possible to determine the cost for implementing this activity at this stage. Funds may be secured from the budgets or from international sources /funds (through grants, projects, etc.)
	BiH: MoFTER in cooperation with FMET, MPPCEE, DSPPA	Entity ministries and department of BD Government responsible for healthcare Inspectorates in FBIH, RS and BD	Regular activities within the budget BiH: 10,000 BAM The cited funds are necessary for the recruitment of expert consultants - if needed
	BiH: MoFTER (coordination) FBIH: FMET RS: MPPCEE BD:DSPPA	Industries	The costs of education will need to be borne by the industry. The funds may be secured from international sources/ funds (through grants, projects, etc.)
	BiH: FBIH: Federal Administration of Civil Protection RS: Republic Administration of Civil Protection of RS BD: Department of Public Safety of BD (Civil Protection service)	Major users of fire fighting foams, MoFTER; other competent ministries and departments of the BD Government	FBIH: 20,000 BAM RS: 20,000 BAM BD: 5,000 BAM The cited funds are necessary for the recruitment of expert national and international consultants and organization of training. Funds may be secured from the budgets or from international sources /funds.
	BiH: MoFTER (coordination) FBIH: FMET RS: MPPCEE BD:DSPPA	Inspectorates in FBIH, RS and BD	Regular activities within the budget – The cited funds are necessary for the organization of workshops, meetings FBIH: 10,000 BAM RS: 8,000 BAM BD: 2,000 BAM
<b>Upon the adoption of the National Implementation Plan</b>			
<b>2015 - 2023</b>			
<b>320,000 BAM (BiH: 10,000 BAM, FBIH: 135,000 BAM, RS: 123,000 BAM, BD: 52,000 BAM)</b>			

### 3.3.8 ACTION PLAN: REGISTER OF EXEMPTIONS AND THE CONTINUING NEED FOR EXEMPTIONS (ARTICLE 4)

The Stockholm Convention enables Parties to register for special exemptions and permission for acceptable usage for production or usage of certain POPs listed under Annexes A and B (Table 1: Chemicals that are on the Stockholm Convention list) when alternatives for them do not yet exist or are not available. The goal is to enable enough time for the Parties to take measures for the reduction or elimination of POPs from deliberate production and usage.

For that purpose, the Secretariat established Registers for the identification of Parties which have special exemptions and permission for acceptable usage of chemicals listed under Annexes A and B.

Special exemptions expire five years from the date of coming into force of the Convention for a certain chemical, unless the Party provides an earlier date of the expiry of the exemption when applying for exemptions or when it is pursuant to Paragraph 7 of Article 4 where an exemption is approved, along with adherence to the provisions from Articles 4, 22 and 25 of the Convention. Acceptable use has no set expiry date, unless the Conference of Parties determines otherwise.

The amendments to Annexes A and B, whereby the list of chemicals limited by the Stockholm Convention was extended to hexabromodiphenyl ether, heptabromodiphenyl ether, lindane, perfluorooctanesulfonic acid, its salts, perfluorooctanesulfonyl fluoride, tetrabromodiphenyl ether and pentabromodiphenyl ether came into force on 26 August 2010.

The Convention also enables the registering of POPs in objects of use, i.e. in chemicals which appear as ingredients of a product which is being produced or was already in use before or on the date of that commitment coming into force in regards to those chemicals.

BiH will submit the following requests to the Secretariat of the Convention for entry into the Registers and Lists which are kept by the Secretariat:

- In the List of objects in use (note (ii), part I of Annexes A and B), BiH needs to list:
  - Fire-fighting foams, because even though fire-fighting foams which contain PFOS are not produced in BiH, the preliminary inventory has shown that there are still fire-fighting foams which may contain PFOS in usage and in supplies;
  - Consumer products such as textiles, including carpets, upholstery, paper and packaging, coatings, and industrial and household cleaning products which may contain PFOS and its related components, which were imported and are still being imported into BiH;
  - Objects which may contain PBDEs (pentaBDE and octaBDE) like electronic equipment and automobiles which were imported and are still being imported into BiH. Namely, even though laboratory testing of objects for the content of these substances was not performed within the Project, the preliminary inventory showed that there are still objects, primarily used electrical and electronic equipment and used automobiles which may contain PBDEs, in usage and in supplies in BiH.
- In the Register of Special Exemptions (Paragraph 1 of Article 4), BiH needs to submit:
  - Hexabromodiphenyl ether and heptabromodiphenyl ether – usage in accordance with Part IV of Annex A. Even though the production, placement on the market and usage of hexabromodiphenyl ether and heptabromodiphenyl ether is prohibited in RS (in FBiH and BD this regulation needs to be passed and adopted in accordance with EU legislation), some recycled products which contain these compounds and products which were produced before the introduction of the restrictions on these substances, and which do contain these substances, cannot be excluded from usage;
  - Tetrabromodiphenyl ether and pentabromodiphenyl ether – usage in accordance with Part V of Annex A. Even though the production, placement on the market and usage of tetrabromodiphenyl ether and pentabromodiphenyl ether is prohibited in RS (in FBiH and BD this regulation needs to be passed and adopted in accordance with EU legislation), some recycled products which contain these compounds and products which were produced before the introduction of restrictions on these substances, and which do contain these substances, cannot be excluded from usage;
  - Perfluorooctanesulfonic acid, its salts and perfluorooctanesulfonyl fluoride for usage in processes of industrial and decorative plating because of the lack of economically acceptable alternatives.

- In the Register of Acceptable Usage of PFOS, its Salts and PFOSF (Paragraph 1, Part III of Annex B), BiH needs to list the usage of these substances for the following activities:
  - for processing photographs,
  - for photoresists or anti-reflecting coating in photolithography processes,
  - for photographic coatings which are applied to films, paper or printing plates,
  - as a tool for engraving for compound semiconductors and ceramic filters
  - as a tool for the suppression of clouding in the process of non-decorative plating in closed systems,
  - as fire-fighting foams,
  - for hydraulic fluids in aviation.

BiH is a potential candidate for EU membership, so in accordance with that it needs to harmonise its legislation with the one that is in force in the EU, such as the *Commission Regulation (EC) No. 757/2010* amending the *Commission Regulation (EC) No. 850/2004* which restricted the placement on the market and usage of a group of compounds with the general name polybrominated diphenyl ethers (PBDEs) and restricted the production, placement on the market and usage of semi-finished products, products or their parts which contain PFOS, as was already done in RS through the *Regulations on the Conditions of Restricting and Prohibiting the Production, Trade and Usage of Chemicals* (Official Gazette of RS, no. 100/10, 63/13).

### 3.3.9 ACTION PLAN: MEASURES TO REDUCE RELEASES FROM UNINTENTIONAL PRODUCTION (ARTICLE 5)

#### 3.3.9.1 Objectives of managing unintentionally produced POPs

The main objective of the Action Plan is to ensure an adequate framework for PCDD/PCDF management in BiH, including the reduction and prevention of their future releases into the environment. Table 175 presents the estimate of total PCDD/PCDF emissions into the environment in BiH for 2012, by source group.

Group	Source group	Total amount of PCDD/PCDF releases (g TEQ/a)
1	Waste incineration	0.1
2	Ferrous and non-ferrous metal production	128.6
3	Heat and power generation	62.9
4	Production of mineral products	4.3
5	Transportation	0.0
6	Open burning processes	0.5
7	Production and use of chemicals	2.5
8	Miscellaneous	0.1
9	Waste disposal	14.8
10	Identification of potential sources of pollution	0.0
1-10	Ukupno	214.1

*Table 175:*  
*Estimate of total PCDD/PCDF emissions into the environment in BiH for 2012, by source group*

Table 176 provides an overview of the main and specific objectives to reduce releases from unintentional production which need to be achieved in order to ensure the full implementation of the Stockholm Convention in BiH.

Reducing releases from unintentional production (Article 5) - Main and specific objectives
<p>Main Objective 1: Improving the legal and institutional framework for the management of unintentionally produced POPs</p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Legislation to ensure the fulfilment of obligations under the Stockholm Convention relating to the management of unintentionally produced POPs drafted / amended / updated and adopted at the level of BiH, FBiH, RS and BD</li> <li>2. Strengthened capacity of institutions in FBiH, RS and BD and enhanced inspection</li> </ol>

*Table 176:*  
*Main and specific objectives to reduce releases from unintentional production*

**Reducing releases from unintentional production (Article 5) - Main and specific objectives**

**Main Objective 2: Reducing unintentional releases of POPs (Annex C) from industry and other sources (heat and power generation, disposal of municipal, medical and other types of hazardous waste, etc.) and the strengthening of inspection and other control capacities**

Specific objectives:

1. Informing industries and institutions that can potentially create PCDD/PCDF during their processes to take steps to prevent emissions of these chemicals in the environment by applying the optimization of processes, treatment of air emissions and/or a change of raw materials or processes, and strengthening the capacity of their employees to apply BAT / BEP
2. Reduced unintentional discharges of POPs listed in Annex C of the Convention for the main sources identified through the application of BAT and BEP
3. Ensured regular monitoring and evaluation of sources and emissions of unintentionally produced POPs

**Main Objective 3: Strengthening technical capacity for collecting, organizing, structuring and processing data on unintentionally produced POPs**

Specific objectives:

1. Established database on unintentional producers of POPs
2. Ranked polluters
3. Updated inventory of unintentionally produced POPs

**Main Objective 4: Raising awareness of the public and target groups, and facilitating access to information on unintentionally produced POPs**

Specific objectives:

1. Relevant information related to unintentionally produced POPs is publicly available

### 3.3.9.2 Planned activities and measures for PCDD/PCDF management

With respect to the requirements of the Stockholm Convention relating to management of unintentionally produced POPs, all Parties are obligated to:

- Identify, label, quantify and determine the most significant sources of unintentionally produced POPs and develop strategies with specific measures, deadlines and objectives for the reduction or elimination of these chemicals, in line with Article 5;
- Implement the best available techniques (BAT) and best environmental practices (BEP) for the chemicals listed in Annex C, Parts II and III, in order to reduce total releases from anthropogenic sources.

For the successful implementation of all obligations under the Stockholm Convention in BiH, the Action Plan to reduce releases from unintentional production has identified specific measures and activities which need to be carried out in accordance with the defined priorities and objectives.

#### **Main Objective 1: Improving the legal and institutional framework for the management of unintentionally produced POPs**

Specific Objective 1.1 Legislation to ensure the fulfilment of obligations under the Stockholm Convention relating to the management of unintentionally produced POPs drafted / amended / updated and adopted at the level of BiH, FBiH, RS and BD

In order to reduce emissions of unintentionally produced POPs is necessary to ensure effective emission control, supervision and monitoring. One of the first activities to be conducted by the relevant ministries of the environment is amendment of existing or adoption of new regulations related to the emission limits, the maximum permitted concentrations of air pollutants, emission monitoring, compliance with the requirements set out in the best available techniques, etc.

Specific Objective 1.2 Strengthened capacity of institutions in FBiH, RS and BD and enhanced inspection

Bearing in mind that the implementation of BAT/BEP is a long process, in addition to changes in technological processes that need to be implemented by the owners of the plants, a significant involvement of staff employed in institutions is also required. For this reason it is necessary to organize continuous education of employees of institutions on communication with the owners of industries, overseeing the implementation of concrete actions and measures, etc.

The ministries responsible for the environment at all administrative levels play an important role in the process of issuing environmental permits, the introduction of BAT/BEP, determining the emission limit values, control, etc. In order to strengthen their capacities, the entity ministries and BD Government department responsible for the environment and inspectorates in FBiH, RS and BD, should organize appropriate training programs that would include issues such as identification of emission sources and their importance, techniques to reduce or eliminate unintentionally produced POPs, methods of implementation of BAT/BEP and comprehensive and long-term monitoring of emissions.

To enable fulfilment of the Stockholm Convention regarding control and monitoring of unintentional releases, it is necessary that the Federal Administration for Inspection Issues, Republic Administration for Inspection Affairs of RS and the Inspectorate of BD Government enhance inspections of implementation of the provisions of environmental permits.

**Main Objective2: Reducing unintentional releases of POPs (Annex C) from industry and other sources (heat and power generation, disposal of municipal, medical and other types of hazardous waste, etc.) and the strengthening of inspection and other control capacities**

Specific Objective 2.1 Informing industries and institutions that can potentially create PCDD/PCDF during their processes to take steps to prevent emissions of these chemicals in the environment by applying the optimization of processes, treatment of air emissions and/or a change of raw materials or processes, and strengthening the capacity of their employees to apply BAT / BEP

The main purpose of informing and educating target groups in relation to PCDD/PCDF is the optimization of production processes in the industry (e.g. an alternative processes with potentially less environmental impacts, continuous monitoring of parameters, recirculation of waste gases, improving the combustion process, effectively collecting the smoke and gases, eliminating dust, use of non-combustion technology and other measures, depending on the category of PCDD/PCDF, in accordance with BAT/BEP) through training of technologists and decision-makers in industries, companies and institutions. The entity ministries responsible for the environment and the competent department of the Government of BD should develop a mechanism for informing the industries which are potential producers of PCDD/PCDF so as to initiate optimization of production processes. For this purpose a mini-campaign, within this action plan, was proposed in order to raise public awareness in terms of preparing informational leaflets and posters and their distribution to stakeholders, primarily departments responsible for processes and production and environmental protection of industries and institutions that manage waste with the potential of unintentional emissions, on daily basis.

The entity ministries and the department of BD government responsible for the environment, in cooperation with entity ministries responsible for the industry, should promote introduction of BAT and BEP and make available information on application of BAT and BEP in BiH, as well as best practices from Europe, to the representatives of the industry through their web pages and other media.

Specific Objective 2.2 Reduced unintentional discharges of POPs listed in Annex C of the Convention for the main sources identified through the application of BAT and BEP

When applying best available techniques and best environmental practices, the Parties should take into consideration the general guidance on prevention and release reduction measures in Annex C and guidelines on BAT/BEP adopted by decision of the Conference of Parties. In accordance with Article 5 of the Convention, the guidelines and guidance, upon adoption by decision of the Conference of the Parties, should be taken into consideration when applying best available techniques and best environmental practices pursuant to subparagraphs (d) and (e) of Article 5.

Results of the preliminary inventory showed that the most unintentionally produced POPs are generated in the production of iron and non-ferrous metals. In order to improve the existing facilities in this sector and to reduce unintentional releases of POPs listed in Annex C of the Convention, it is necessary to implement appropriate BAT/BEP measures. It should be noted that these measures require considerable investment in infrastructure. Although the implementation of these measures is the obligation of the owners of industry, the entity ministries responsible for the environment, in cooperation with the ministries of industry and the Ministry of Foreign Trade and Economic Relations of BiH, need to help the owners of the industry in providing resources for the implementation of BAT/BEP measures, through donations and projects funded by international funds. The implementation of BAT/BEP should also be taken into account when building new facilities.

The entity ministries responsible for the environment and the competent department of the Government of BD need to ensure regular monitoring of POPs compounds from Annex C of the Convention in commercial entities which unintentionally produce and release them, incorporate them in the database and keep statistical records of the changes in concentrations of the measured parameters. This activity necessitates the accreditation of laboratories to enable them to perform adequate tests (as defined under the *Action Plan 3.3.18 Research, development and monitoring*). In addition, inspection bodies in FBIH, RS and BD should supervise the implementation of these practices in the industries.

Specific Objective 2.3 Ensured regular monitoring and evaluation of sources and emissions of unintentionally produced POPs

The entity ministries responsible for the environment and the competent department in the Government of BD need to update the information on the types, quantities and emitters of

unintentionally produced POPs, provide recommendations in accordance with BAT and BEP and carry out statistical analysis of the changes in concentrations of POPs in the course of time.

In addition, the industries need to assess releases after applying BAT and BEP within prescribed programs and deadlines, with the support of the entity ministries responsible for the environment and the competent department of the Government of BD, and to predict preventive measures in order to reduce releases of unintentionally produced POPs as part of reporting on environmental impacts. The competent institutions in FBiH, RS and BD, primarily the ministries responsible for the environment should, in cooperation with the entity ministries of the industry, establish a system for monitoring the effectiveness of BAT/BEP. The institutions responsible for environmental monitoring should periodically monitor the key indicators of pollution and the parameters which indicate the current state of the environment in industries where BAT/BEP measures were applied. Based on the results of the environmental monitoring, the competent ministries will review the effectiveness of BAT/BEP and provide recommendations for future activities to be carried out on the subject locations.

### **Main Objective 3: Strengthening technical capacity for collecting, organizing, structuring and processing data on unintentionally produced POPs**

#### Specific Objective 3.1 Established database on unintentional producers of POPs

The entity ministries and the department in BD Government responsible for environment need to make a list of all sources of unintentionally produced POPs in sectors that are singled out as the largest emitters of these emissions, selected based on established criteria, such as the type of activity and waste emissions related to POPs, and existing information about contaminated sites in BiH. For this activity, it will be necessary to engage an expert, in consultation with MoFTER. The entity ministries responsible for the environment and the competent department in the Government of BD should consider the possibility of incorporating this data into the existing registers of plants and pollution.

In cooperation with the inspection authorities of FBiH, RS, and BD, the entity ministries and department in the Government of the BD responsible for environment should ensure regular annual submission of data by business entities on emissions of unintentionally produced POPs in all segments of the environment, in order to incorporate them in the registers of plants and pollution.

#### Specific Objective 3.2 Ranked polluters

For the effective management and reduction of PCDD/PCDF, the entity ministries responsible for the environment and the competent department of the Government of BD need to, through engagement of independent experts, coordinate and supervise the detailed analysis of releases of these chemicals in industries which were singled out by the PCDD/PCDF Inventory Group during preliminary inventory as the most significant polluters. Thereafter, industry and other institutions should be able to apply mechanisms to reduce emissions, in accordance with BAT and BEP recommendations of the Stockholm Convention.

In addition, the ministries need to take steps to record hot spots contaminated with unintentionally produced POPs (this activity is covered under the *Strategy and Action*

*Table 177:  
Action Plan 3.3.9:  
Measures to reduce  
releases from  
unintentional production  
(Article 5)*

Action Plan 3.3.9: Measures to reduce releases from unintentional production (Article 5)		
Objectives	Activities	Time frame
<b>Main Objective 1: Improving the legal and institutional framework for the management of unintentionally produced POPs</b>		
<b>Specific Objective 1.1</b> Legislation to ensure the fulfilment of obligations under the Stockholm Convention relating to the management of unintentionally produced POPs drafted / amended / updated and adopted at the level of BiH, FBiH, RS and BD	<b>Activity 1.1.1</b> Through legal and subordinate legislation, define the limits of unintentionally produced POPs into the environment, ways of monitoring emissions and monitoring, meeting the requirements specified in BAT (primarily in heavy and non-ferrous metallurgy and energy production)	2015-2016
<b>Specific Objective 1.2.</b> Strengthened capacity of institutions in FBiH, RS and BD and enhanced inspection	<b>Activity 1.2.1</b> Strengthen the capacity of employees of ministries and inspections related to the implementation of BAT/BEP in the process of obtaining environmental permits and further control of BAT/BEP implementation to reduce unintentional production of POPs, to ensure comprehensive and long-term emissions monitoring	2015 – 2020
	<b>Activity 1.2.2</b> Increase inspection of the implementation of the provisions contained in environmental permits	2015 -
<b>Main Objective2: Reducing unintentional releases of POPs (Annex C) from industry and other sources (heat and power generation, disposal of municipal, medical and other types of hazardous waste, etc.) and the strengthening of inspection and other control capacities</b>		

*Plan 3.3.13: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner).*

Specific Objective 3.3 Updated inventory of unintentionally produced POPs

During the preliminary inventory of unintentionally produced POPs a lack of statistical data has been identified (e.g. waste incinerators, sintering of iron ore, production of non-ferrous metals, e-waste recycling, grinding waste, landfill biogas, dumpsite burning, etc.), as well as lack of knowledge of responsible personnel in industries which completed questionnaires. In addition, the preliminary inventory was performed by the NEA, and it is necessary to transfer this knowledge to employees of ministries responsible for the environment, as well as environmental inspectors. Entity ministries and department in the Government of BD responsible for environment need to engage a professional consultant to provide training, and in cooperation with MoFTER, define the types of data required, data collection process and data sources that will be used when updating the inventory. The forms and questionnaires used during the preliminary inventory can be the basis for the development of future inventories, and identification of missing data and data sources.

In accordance with the provisions of the Stockholm Convention, Parties need to regularly update the inventory of unintentionally produced POPs, and prepare a report on the release of unintentionally produced POPs that National Focal Point submits to the Secretariat of the Stockholm Convention every five years. In addition, Parties are obliged to submit annual reports to the European Environmental Agency.

#### **Main Objective 4: Raising awareness of the public and target groups, and facilitating access to information on unintentionally produced POPs**

Specific Objective 4.1 Relevant information related to unintentionally produced POPs is publicly available

The entity ministries responsible for the environment and the competent department of the Government of BD, in consultation with MoFTER need to implement programs to raise public awareness of citizens of all levels of education and of all civil society institutions through workshops, printing brochures, flyers, providing electronic information in the form of websites and portals for the general population. Special attention should be paid to information on harmful impacts of unintentionally produced and released POPs on human health.

All data relating to monitoring results, human and environmental exposure and activities for reducing the unintentionally produced and released POPs should be made available to the public. This activity is discussed in detail within *Action Plan 3.3.15 Public awareness, information and education*.

Action plan for management of PCBs (Table 177) includes the planned measures and activities that need to be implemented for the successful implementation of all obligations under the Stockholm Convention in BiH, identifies institutions responsible for their implementation, as well as the time frame and the estimated necessary funds.

	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: FBiH: FMET RS: MoPPCEE BD: DSPPA	Commercial entities; Inspectorates of FBiH, RS, BD	Regular activities within budget FBiH: 7,000 BAM RS: 7,000 BAM BD: 7,000 BAM Funds necessary for the recruitment of expert consultants to assist in drafting regulations
	BiH: FBiH: FMET, FAI RS: MoPPCEE, RAIA BD: DSPPA, Inspectorate of BD Government	Cantonal ministries and local governments responsible for the environment; Other relevant state and entity ministries and departments in the BD Government	Regular activities within budget FBiH: 50,000 BAM (10,000 BAM/god) RS: 35,000 BAM (7,000 BAM/god) BD: 5,000 (1,000 BAM/god) Funds necessary for organization of workshops, meetings and the recruitment of expert consultants
	BiH: FBiH: FAI RS: RAIA BD: Inspectorate of BD Government	Entity ministries and the department of BD Government responsible for the environment, occupational health and safety; Industry representatives	Regular activities within budget

Action Plan 3.3.9: Measures to reduce releases from unintentional production (Article 5)		
Objectives	Activities	Time frame
<b>Specific Objective 2.1.</b> Informing industries and institutions that can potentially create PCDD/PCDF during their processes to take steps to prevent emissions of these chemicals in the environment by applying the optimization of processes, treatment of air emissions and/or a change of raw materials or processes, and strengthening the capacity of their employees to apply BAT / BEP	<b>Activity 2.1.1</b> Develop a mechanism to inform industry about the optimization of production processes	2016 -2017
	<b>Activity 2.1.2</b> Promote the introduction of BAT and BEP in industry, energy sector, waste management sector, medical and other institutions, and make BAT and BEP applied in the EU available and user-friendly via the web and other media	2016 and onwards
<b>Specific Objective 2.2</b> Reduced unintentional discharges of POPs listed in Annex C of the Convention for the main sources identified through the application of BAT and BEP	<b>Activity 2.2.1</b> Implement BAT/BEP measures in the production of iron and non-ferrous metals	2016 – 2025
	<b>Activity 2.2.2</b> Apply means to reduce unintentionally produced POPs into the environment (filters, purification systems, non-incineration technology, etc.) from other sources, in accordance with the recommendations of BAT and BEP	2016 – 2025
<b>Specific Objective 2.3</b> Ensured regular monitoring and evaluation of sources and emissions of unintentionally produced POPs	<b>Activity 2.3.1</b> Appoint and additionally educate (if necessary) responsible laboratories that can perform qualitative and quantitative analysis, and monitor unintentionally produced POPs according to legal provisions	
	<b>Activity 2.3.2</b> Regularly monitor POPs compounds from Annex C of the Convention in industrial entities and other institutions in the sectors of energy, waste disposal and health care that unintentionally produce them, include them into the database, and keep statistical records about changes in the concentration of measured parameters	2016 and onwards
	<b>Activity 2.3.3</b> Continuously analyze the effectiveness of implemented BAT and BEP	2016 and onwards
<b>Main Objective 3: Strengthening technical capacity for collecting, organizing, structuring and processing data on unintentionally produced POPs</b>		
<b>Specific Objective 3.1.</b> Established database on unintentional producers of POPs	<b>Activity 3.1.1</b> Make a list of all sources of unintentionally produced POPs <i>Database of sources should be linked or a part of the existing registers of plants and pollution</i>	2015-2016
	<b>Activity 3.1.2</b> Ensure timely annual submission to register of plants and pollution of data by businesses and other institutions on emissions of unintentionally produced POPs in all segments of the environment	2015 and onwards
<b>Specific Objective 3.2</b> Ranked polluters	<b>Activity 3.2.1</b> Based on the list of all sources of unintentionally produced POPs, rank polluters to enable taking the necessary steps	2016 - 2020
	<b>Activity 3.2.2</b> Record hot spots contaminated with unintentionally produced POPs	
<b>Specific Objective 3.3</b> Updated inventory of unintentionally produced POPs	<b>Activity 3.3.1</b> Train the employees of ministries and other relevant institutions related to update of inventory of unintentionally produced POPs and its harmonization with register of plants and pollution	2016
	<b>Activity 3.3.2</b> Periodically update the inventory of unintentionally produced POPs - estimate the volume of emissions in all segments of the environment	Periodic updating of data in accordance with the request of the Convention for reporting
	<b>Activity 3.3.3</b> Develop reports on the release of unintentionally produced POPs (further elaborated under <i>Action Plan 3.3.17: Reporting</i> )	Every 5 years



	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: FBiH: FMET RS: MoPPCEE BD: DSPPA	Other competent state and entity ministries and departments in the BD Government; Analytical and automated laboratories; Commercial entities	Regular activities within budget FBiH: 15,000 BAM RS: 10,000 BAM BD: 5,000 BAM
	BiH: - FBiH: FMET RS: MoPPCEE BD: DSPPA	Industry and other economic operators, utility companies, medical facilities, etc.	Regular activities within budget FBiH: 18,000 BAM (2,000 BAM/god) RS: 13,500 BAM (1,500 BAM/god) BD: 9,000 BAM (1,000 BAM/god) Funds needed for the development of guidelines and updating of websites
	BiH: MoFTER (coordination) FBiH: FMET RS: MoPPCEE BD: DSPPA	Commercial entities; Inspectorates of FBiH, RS, BD; Environmental funds in FBiH, RS and BD	25 – 35 million BAM Funds necessary for the reconstruction of plants. It is necessary to provide funds through donations and through projects funded by international funds.
	BiH: MoFTER (coordination) FBiH: FMET RS: MoPPCEE BD: DSPPA	Commercial entities and other facilities that release POPs listed in Annex C; Other relevant ministries in FBiH, RS and BD; Inspectorates of FBiH, RS and BD; Environmental funds in FBiH, RS and BD	The amount of funds will be possible to determine when all companies and institutions which need to apply BAT and BEP are identified. Funding by the owners themselves or through donations and internationally funded projects.

*This activity is described in detail in Action Plan 3.3.18. Research, monitoring and development*

	BiH: - FBiH: FMET; Commercial entities RS: MoPPCEE; Commercial entities BD: DSPPA; Commercial entities	Analytical and automated laboratories; Commercial entities; Inspectorates of FBiH, RS and BD	Regular activities within budget FBiH: 54,000 BAM (6,000 BAM/god) RS: 45,000 BAM (5,000 BAM/god) BD: 13,500 BAM (1,500 BAM/god) Funds necessary to ensure the professional capacities for monitoring.
	BiH: FBiH: FMET RS: MoPPCEE BD: DSPPA	Commercial entities; Inspectorates of FBiH, RS and BD	FBiH: 15,000 BAM RS: 12,000 BAM BD: 3,000 BAM Source of funding: Budgets of FBiH, RS and BD, Environmental funds
	BiH: MoFTER (coordination) FBiH: FMET, EF RS: MoPPCEE, EPEE BD: DSPPA	Commercial entities	Regular activities within budget and Environmental funds FBiH: 30,000 BAM RS: 25,000 BAM BD: 5,000 BAM Funds necessary for developing lists and the recruitment of expert consultants
	BiH: - FBiH: FMET, FAI RS: MoPPCEE, RAIA BD: DSPPA, Inspectorate of BD Government	Commercial entities	Regular activities within budget
	BiH: FBiH: FMET RS: MoPPCEE BD: DSPPA	Commercial entities; Inspectorates of FBiH, RS and BD	Regular activities within budget

*This activity is described in detail in Strategy and Action Plan 3.3.13: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner*

	BiH: MoFTER (coordination) FBiH: FMET RS: MoPPCEE BD: DSPPA	Cantonal ministries of environment, Inspectorates of FBiH, RS and BD	Regular activities within budget FBiH and cantons: 30,000 BAM RS: 15,000 BAM BD: 5,000 BAM Funds necessary for organization of workshops, meetings and the recruitment of expert consultants
	BiH: FBiH: FMET RS: MoPPCEE BD: DSPPA	Commercial entities; Other competent state and entity ministries and departments in the BD Government; Inspectorates of FBiH, RS and BD; Team of experts	Regular activities within budget FBiH: 20,000 BAM RS: 15,000 BAM BD: 5,000 BAM Funds for update of inventories and the recruitment of expert consultants (as needed)
	BiH: MoFTER in cooperation with FMET, MoPPCEE and DSPPA	Entity ministries and the department of BD Government responsible for health; Inspectorates of FBiH, RS and BD	Regular activities within budget BiH: 10,000 BAM Funds for the recruitment of expert consultants (as needed)

Action Plan 3.3.9: Measures to reduce releases from unintentional production (Article 5)		
Objectives	Activities	Time frame
<b>Main Objective 4: Raising awareness of the public and target groups, and facilitating access to information on unintentionally produced POPs</b>		
Specific Objective 4.1. Relevant information related to unintentionally produced POPs is publicly available	<b>Activity 4.1.1</b> Raise public awareness at all levels of education and all the institutions of civil society through workshops, booklets, leaflets, electronic information in the form of web sites and portals for general population	2016 and onwards
Expected commencement of implementation of the action plan		
Duration of the implementation of the action plan		
Total estimated required financial resources		

### 3.3.10 ACTION PLAN: MEASURES TO REDUCE RELEASES FROM STOCKPILES AND WASTES (ARTICLE 6)

This action plan was not elaborated separately, as it is contained in the following action plans:

- Action Plan 3.3.3: Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)
- Action Plan 3.3.4: Production, import and export, use, identification, labelling, removal, storage and disposal of polychlorinated biphenyls (PCBs) and equipment containing PCBs (Annex A, Part II)
- Action Plan 3.3.5: Production, import and export, use, stockpiles and wastes of hexaBDE and heptaBDE (Annex A, Part IV) and tetraBDE and pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I) and
- Action Plan 3.3.7: Production, import and export, use, stockpiles and wastes of PFOS, its salts and PFOSF (Annex B, Part III).

### 3.3.11 STRATEGY: IDENTIFICATION OF STOCKPILES, ARTICLES IN USE AND WASTES

The strategy for identification of stockpiles, articles in use and wastes was not elaborated separately, as it is contained in the following action plans:

- Action Plan 3.3.3: Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)
- Action Plan 3.3.4: Production, import and export, use, identification, labelling, removal, storage and disposal of polychlorinated biphenyls (PCBs) and equipment containing PCBs (Annex A, Part II)
- Action Plan 3.3.5: Production, import and export, use, stockpiles and wastes of hexaBDE and heptaBDE (Annex A, Part IV) and tetraBDE and pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I) and
- Action Plan 3.3.7: Production, import and export, use, stockpiles and wastes of PFOS, its salts and PFOSF (Annex B, Part III).

### 3.3.12 ACTION PLAN: MANAGEMENT OF STOCKPILES AND APPROPRIATE MEASURES FOR HANDLING AND DISPOSAL OF ARTICLES IN USE

This action plan was not elaborated separately, as it is contained in the following action plans:

- Action Plan 3.3.3: Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)

Competent institution/organization	Stakeholders	Estimated financial resources
BiH: MoFTER (coordination) FBiH: FMET, FMH RS: MoPPCEE, MHSW BD: DSPPA, DHOS	General public	Regular activities within budget FBiH: 31,500 (3,500 BAM/god) RS: 30,000 BAM (3,300 BAM/god) BD: 9,000 BAM (1,000 BAM/god) Funds necessary for workshops, booklets, leaflets, and the engagement of professional consultants - as needed
<b>Upon the adoption of the NIP</b>		
<b>2015 – 2025</b>		
554,500 BAM (BiH: 10,000 BAM, FBiH: 270,500 BAM, RS: 207,500 BAM, BD: 66,500 BAM) + 25 – 35 million BAM for implementation of Activity 2.2.1 (funding should be provided from international funds)		

- Action Plan 3.3.4: Production, import and export, use, identification, labelling, removal, storage and disposal of polychlorinated biphenyls (PCBs) and equipment containing PCBs (Annex A, Part II)
- Action Plan 3.3.5: Production, import and export, use, stockpiles and wastes of hexaBDE and heptaBDE (Annex A, Part IV) and tetraBDE and pentaBDE (Annex A, Part V) and HBB, where applicable (Annex A, Part I) and
- Action Plan 3.3.7: Production, import and export, use, stockpiles and wastes of PFOS, its salts and PFOSF (Annex B, Part III).

### 3.3.13 STRATEGY AND ACTION PLAN: IDENTIFICATION OF CONTAMINATED SITES (ANNEX A, B AND C) AND REMEDIATION IN AN ENVIRONMENTALLY SOUND MANNER

#### 3.3.13.1 Objectives of identification of contaminated sites and remediation in an environmentally sound manner

The main objective of this strategy is to reduce environmental pollution through remediation and recovery of the identified sites contaminated with POPs. Table 178 provides an overview of the main and specific objectives for the identification of contaminated sites and their remediation in an environmentally sound manner that need to be accomplished in order to ensure the implementation of the Stockholm Convention in BiH.

Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner - Main and specific objectives

**Main Objective 1. Enhancing or creating an adequate legal and institutional framework related to contaminated sites "hot-spots"**

Specific objective:

1. Adopted/harmonized regulations in FBiH, RS and BD and strengthened capacity to manage contaminated sites

**Main Objective 2. Ensuring an adequate management system of contaminated areas ("hot spots")**

Specific objectives:

1. Established system of management and remediation of contaminated sites
2. Remediation of priority areas and ensured monitoring of remediation effects

*Table 178:  
Main and specific  
objectives of identifying  
contaminated sites  
(Annex A, B and C)  
and remediation in an  
environmentally sound  
manner*

During 2013 and 2014, the Japan International Cooperation Agency – JICA, in collaboration with the Ministry of Foreign Trade and Economic Relations of BiH and the Federal Ministry of Environment and Tourism, implemented the "Project for Master Plan for Remediation of Hotspots in Bosnia and Herzegovina". The project was funded by the Japanese Government, and prepared for the needs of the Federation of Bosnia and Herzegovina. The main objective of the project was the development of a Master Plan for the sustainable development and proper treatment of environmental hotspots located in FBiH, and strengthening of capacities of relevant organizations for policy planning and environmental management in FBiH. The relevant activities defined in the Master Plan have been applied in this Action Plan.

### 3.3.13.2 Planned activities and measures for identification of contaminated sites and remediation in an environmentally sound manner

#### Main Objective 1: Enhancing or creating an adequate legal and institutional framework related to contaminated sites “hot-spots”

Specific Objective 1.1 Adopted/harmonized regulations in FBiH, RS and BD and strengthened capacity to manage contaminated sites

In order to facilitate the fulfilment of the provisions of the Stockholm Convention, it is necessary to amend the existing legislation or adopt new legislation in the area of identification of sites contaminated with POPs and other hazardous waste, and remediation in an environmentally sound manner. Due to the fact that the identification of contaminated sites represents a complex and sensitive environmental problem which may carry implications for site owners, workers, local communities and other stakeholders, the entity ministries (and the BD Government Department) responsible for environmental protection should define the criteria for identifying sites contaminated with POPs, establish the principles and guidelines for contaminated site surveys, and provide professional support to relevant institutions in BiH.

In order to define the management of contaminated areas, including areas contaminated with POPs, the entity ministries (and BD Government Department) responsible for environmental protection should adopt new or amend the existing legislation on environmental protection and waste management in order to define the issues pertaining to contaminated site management. Aspects to be covered include:

- Defining contaminated sites;
- Defining the responsibility framework;
- Institutional control;
- Public involvement and risk communication;
- Financing remediation projects.

Prior to the adoption of the legal framework on contaminated site management, the aforementioned institutions in FBiH, RS and BD, in cooperation with the Ministry of Foreign Trade and Economic Relations of BiH, should carefully examine all of the above aspects. Since the adoption of such a legal framework will not only impact the owners of contaminated sites, but also the owners of neighbouring sites, local communities, workers, and other interest groups, the far-reaching consequences of these issues should be considered during the drafting of such legislation.

In order to strengthen the capacities of institutions in BiH responsible for the management and remediation of contaminated sites, it is necessary to evaluate the necessity of organizing training for employees and, if needed, organize training for employees on various stages of contaminated site remediation, such as field-testing, risk assessment, development of remediation plans, implementation and monitoring, as well as the appropriate techniques and procedures for remediation of contaminated sites.

#### Main Objective 2: Ensuring an adequate management system of contaminated areas (“hot spots”)

Specific Objective 2.1 Established system of management and remediation of contaminated sites

##### *Preliminary survey of potential contaminated areas*

In order to collect basic information on contaminated sites in BiH, including those contaminated with POPs, as well as information necessary for the establishment of registers, it is necessary that the entity ministries (and the BD Government Department) responsible for the environment, in cooperation with the entity ministries (and BD Government Department) responsible for agriculture, water management and forestry, conduct a preliminary survey of potential contaminated sites during which the following information should be collected:

- General information on the site
- Economic activities at the site, if any (current owner, former owners, information on privatization, type of industrial activity, type of product, number of employees, etc.)
- Potentially polluting activities
- Site conditions (source of pollution (illegal disposal sites, landfills, wastewater landfills, contaminated soil, storage of hazardous chemicals, underground storage, etc.), estimated amount of pollution, previous surveys and remediation activities, information on the concentration of pollutants in soil, water and air, etc.)

- Impacts on the environment and human health (sensitive receptors, routes of exposure, etc.)
- Legal and administrative information (regulations, permits, etc.).

The competent government institutions need to conduct a preliminary survey of sites potentially contaminated with POPs, selected on the basis of established criteria, such as the type of industrial activity associated with the emission of POPs, natural characteristics and sensitivity of the area, as well as any existing and available data on monitoring of POPs in BiH.

Data collected during the preliminary survey will serve for the purpose of establishing provisional registries of contaminated sites in FBiH, RS and BD. The drafting and adoption of a legal framework for the management of contaminated areas will enable the establishment of official registries of contaminated sites in FBiH, RS and BD.

#### *Establishment of registries of contaminated sites*

One of the main objectives of establishing registries of contaminated areas in FBiH, RS and BD is managing contaminated areas in accordance with the relevant laws and regulations. Given the lack of legal regulations that govern the management and remediation of contaminated sites, the competent institutions should consider performing this task in two phases:

- Phase I– Establishment of provisional registries of contaminated sites in FBiH, RS and BD
- Phase II- Establishment of official registries of contaminated sites in FBiH, RS and BD.

Information collected during the preliminary survey of potential contaminated areas needs to be organized in the form of provisional site registries. The provisional registries will provide a rough overview of the number and size of contaminated sites, potential priority sites, technical capacities available in BiH, the necessary financial resources, etc. However, information enlisted in the provisional registries may be insufficiently aligned with the regulations that govern the management of contaminated areas in BiH, which should be adopted in FBiH, RS and BD.

After the establishment of the necessary legal and institutional framework for the management of contaminated areas in BiH, it will be possible to establish official registries of contaminated areas in FBiH, RS and BD, which will be part of environmental information systems whose establishment is required under the laws on environmental protection in FBiH, RS and BD.

The key segment of the functioning of the entire system is harmonizing the functioning of the registries in FBiH, RS and BD, as well as ensuring adequate exchange of information in the horizontal direction between the competent institutions in FBiH, RS and BD, as well as in the vertical direction between the entities (and cantons within FBiH) and the institutions of BiH.

#### *Development of technical guidelines for remediation of contaminated sites*

In BiH, there are no technical guidelines for the identification and remediation of contaminated sites, including sites contaminated with POPs. This Action Plan includes the drafting of such technical guidelines for each process in the procedure of contaminated site surveys and remediation, including:

- Identification of potential contaminated sites;
- Preliminary survey of potential contaminated sites;
- Preliminary evaluation of potential contaminated sites;
- Detailed surveys;
- Risk assessment;
- Development of remediation plans,
- Implementation of remediation plans,
- Monitoring and follow-up measures.

#### *Detailed survey of sites contaminated with POPs*

Based on data obtained during the preliminary survey of potential sites contaminated with POPs, it is necessary to conduct a detailed survey that will represent the basis for prioritization, if such priorities could not be determined on the basis of the preliminary survey.

The detailed survey includes:

- Chemical analysis of samples of potentially contaminated soil and/or waste, in order to correctly estimate the degree of contamination of soil, surface water and groundwater;

- Modelling (as necessary) in order to determine the spreading of contamination;
- Risk assessment;
- Collecting other information necessary for the development of remediation plans.

*Prioritization of sites contaminated with POPs and development of a list of priorities for remediation*

Based on data obtained during the preliminary and detailed survey of sites contaminated with POPs, it is necessary to create a list of priorities for recovery and remediation of contaminated sites. It will be possible to determine certain priorities for remediation after the preliminary survey itself, in case there is available documentation on research conducted in the earlier period.

*Development of remediation and rehabilitation plans for sites contaminated with POPs*

Owners of sites<sup>187</sup> contaminated with POPs, in cooperation with the relevant ministries in FBiH, RS and BD should develop remediation and rehabilitation plans for these sites. Such plans should include:

- Objectives of remediation, including in cases where complete remediation is not feasible;
- Information on future land use, the impact on the local economy, benefits to stakeholders in the area of influence;
- Technical remediation options available in BiH;
- The selected remediation option;
- The plan for disposal of hazardous waste generated through the removal of contaminated soil and/or wastewater;

*Table 179:  
Strategy and Action Plan  
3.3.13: Identification  
of contaminated sites  
(Annex A, B and C)  
and remediation in an  
environmentally sound  
manner*

Strategy and Action Plan 3.3.13: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner		
Objectives	Activities	Time frame
<b>Main Objective 1. Enhancing or creating an adequate legal and institutional framework related to contaminated sites "hot-spots"</b>		
<b>Specific Objective 1.1</b> Adopted/harmonized regulations in FBiH, RS and BD and strengthened capacity to manage contaminated sites	<b>Activity 1.1.1</b> Analyze the basic questions that precede the development of the legal framework for management of contaminated areas: ▪ Defining the contaminated sites; ▪ Defining the framework of responsibilities; ▪ Institutional control; ▪ Public involvement and risk communication; ▪ Financing of remediation projects	2016 -2018
	<b>Activity 1.1.2</b> Create new or update existing legislation on environmental protection and waste management that defines the management of contaminated sites	2018
	<b>Activity 1.1.3</b> Carry out employee training in institutions responsible for managing contaminated sites	2016 - 2017
<b>Main Objective 2. Ensuring an adequate management system of contaminated areas ("hot spots")</b>		
<b>Specific Objective 2.1</b> Established system of management and remediation of contaminated sites	<b>Activity 2.1.1</b> Carry out a preliminary survey of potential sites contaminated with POPs	2016 -2017
	<b>Activity 2.1.2</b> Establish temporary registers of contaminated areas	End 2017
	<b>Activity 2.1.3</b> Establish official registers of contaminated areas	2018 - 2020

<sup>187</sup> Site owners:

- For private sites – private owners
- For state owned sites – public authorities at the level of the state, entities (and BD), cantons and local self-government units

- The implementation schedule;
- Funds needed for remediation.

In addition to the site owners, the responsibility to develop remediation plans lies with the relevant ministries in FBiH, RS and BD.

Specific Objective 2.2 Remediation of priority areas and ensured monitoring of remediation effects

#### *Remediation of priority sites contaminated with POPs*

Remediation of sites contaminated with POPs should be carried out in accordance with the remediation plans. The development of remediation plans and the remediation of sites determined as sites requiring urgent measures may be commenced prior to the detailed survey and site prioritization.

The implementation of this activity will require funding from international sources (grants, projects). The exact amount required for the remediation of sites contaminated with POPs will be determined after the preliminary and detailed surveys, and the development of remediation plans.

#### *Monitoring the effects of remediation*

The competent institutions in FBiH, RS and BD should establish a system for monitoring the effects of remediation. Remediated sites should be monitored at certain intervals in terms of key indicators of pollution and parameters indicating the current state of the environment. The effects of remediation will be determined based on the results of environmental monitoring, and recommendations for future activities to be carried out at such sites will be provided.

	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: MoFTER (coordination) FBiH: FMET, FMAWMF RS: MPPCEE, MAFWM BD: DSPPA, DAFWM	Other competent state and entity ministries and departments of the BD Government; Environmental experts, lawyers, sociologists and other technical experts	Regular activities within the budget FBiH: 15,000 BAM RS: 10,000 BAM BD: 5,000 BAM Funds for the recruitment of specialized consultants (if necessary)
	BiH: - FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget
	BiH: MoFTER (coordination) FBiH: FMET, FMAWMF RS: MPPCEE, MAFWM BD: DSPPA, DAFWM	Other competent state and entity ministries and departments of the BD Government; Inspectorates of FBiH, RS and BD	Regular activities within the budget FBiH: 20,000 BAM RS: 15,000 BAM BD: 5,000 BAM Funds for the recruitment of specialized consultants.
	BiH: MoFTER (coordination) FBiH: FMET, FMAWMF RS: MPPCEE, MAFWM BD: DSPPA, DAFWM	Other competent state, entity and cantonal ministries and departments of the BD Government; Inspectorates of FBiH, RS and BD; Local government units; Team of experts	FBiH: 80,000 BAM RS: 60,000 BAM BD: 10,000 BAM The funds to be provided from international sources/funds.
	BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH: 25,000 BAM RS: 20,000 BAM BD: 5,000 BAM
	BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government	Regular activities within the budget FBiH: 10,000 BAM RS: 8,000 BAM BD: 2,000 BAM

Strategy and Action Plan 3.3.13: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner		
Objectives	Activities	Time frame
	<b>Activity 2.1.4</b> Define technical guidelines for remediation of contaminated sites	2017 - 2018
	<b>Activity 2.1.5</b> Carry out detailed survey of sites contaminated with POPs	2018 - 2020
	<b>Activity 2.1.6</b> Prioritize areas contaminated with POPs and develop the list of priorities for remediation	2019 - 2020
	<b>Activity 2.1.7</b> Develop plans for remediation and remediation of sites contaminated with POPs	2017 - 2021
<b>Specific Objective 2.2</b> Remediation of priority areas and ensured monitoring of remediation effects	<b>Activity 2.2.1</b> Remediate priority sites contaminated with POPs	2017 - 2022
	<b>Activity 2.2.2</b> Monitor the effects of remediation	2018 - 2025
<b>Expected commencement of implementation of the action plan</b>		
Duration of the implementation of the action plan		
<b>Total estimated required financial resources</b>		

\* The cost of implementing this action plan **does not include** the cost of remediation of priority sites contaminated with POPs. The exact amount required will be determined upon completion of Activities 2.1.1, 2.1.5 and 2.1.7.

### 3.3.14 ACTION PLAN: FACILITATING OR UNDERTAKING INFORMATION EXCHANGE AND STAKEHOLDER INVOLVEMENT

#### 3.3.14.1 Objectives of undertaking information exchange

The main objective of this Action Plan is to establish an efficient system of information exchange between relevant institutions in the FBiH, RS and BD and the National Focal Point. Improving the exchange of information between competent institutions with prior strengthening of the technical capacities for collecting, organizing, structuring and processing data on POPs in BiH, including the establishment and coordination of information systems in FBiH, RS and BD is one of the priorities identified during the development of the NIP.

For the purpose of compiling data on POPs, state and entity level authorities should ensure that the competent institutions establish a phased program for monitoring of POPs, which would be closely linked to the information systems in FBiH, RS and BD, and which would integrate the system of management of POPs in BiH. It is also essential that the competent



Competent institution/organization	Stakeholders	Estimated financial resources
BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; specialized consultants	FBiH: 48,000 BAM RS: 42,000 BAM BD: 10,000 BAM Funds for the development of guidelines and the recruitment of specialized consultants. Funds may be provided from the budget or from international sources/funds.
BiH: MoFTER (coordination) FBiH: FMET, FMAWMF RS: MPPCEE, MAFWM BD: DSPPA, DAFWM	Other competent state, entity and cantonal ministries and departments of the BD Government; Inspectorates of FBiH, RS and BD; Local government units; Team of experts	FBiH: 155,000 BAM RS: 80,000 BAM BD: 15,000 BAM Funds may be provided from international sources/funds.
BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent state and entity ministries and departments of the BD Government; Team of experts	FBiH: 50,000 BAM RS: 40,000 BAM BD: 10,000 BAM Funds may be provided from international sources/funds.
BiH: - FBiH: Owners of the locations; FMET, FMAWMF RS: Owners of the locations; MPPCEE, MAFWM BD: Owners of the locations; DSPPA, DAFWM Owners of the locations: ▪ For private locations - private owners ▪ For locations owned by the state – authorities at the level of state, entity (and BD), cantons and local government units	Other competent state, entity and cantonal ministries and departments of the BD Government; Inspectorates of FBiH, RS and BD; Local government units; Team of experts	Private owners - from their own budgets; Authorities - regular activities within the budget of ministries and local government units with the international donations and recruitment of specialized consultants FBiH: 75,000 BAM RS: 40,000 BAM BD: 5,000 BAM
BiH: MoFTER (coordination) FBiH: Owners of the locations; FMET, FMAWMF RS: Owners of the locations; MPPCEE, MAFWM BD: Owners of the locations; DSPPA, DAFWM	Other competent state, entity and cantonal ministries and departments of the BD Government; Inspectorates of FBiH, RS and BD; Local government units; Team of experts	For the implementation of this activity it is necessary to provide financial resources from international funds (donations, projects). The exact amount needed will be determined upon completion of Activities 2.1.1, 2.1.5 and 2.1.7
BiH: - FBiH: FMET, FMAWMF RS: MPPCEE, MAFWM BD: DSPPA, DAFWM	Other competent state, entity and cantonal ministries and departments of the BD Government; Inspectorates of FBiH, RS and BD; Local government units; Agencies and institutes responsible for environmental monitoring and health protection	Regular activities within the budget FBiH: 55,000 BAM RS: 40,000 BAM BD: 5,000 BAM Funds for the recruitment of specialized consultants.
Upon the adoption of the NIP		
2015 – 2025		
960,000 BAM * (FBiH: 533,000 BAM, RS: 355,000 BAM, BD: 72,000 BAM)		

institutions in BiH, FBiH, RS and BD ensure cooperation and collaboration, in terms of data and information, between the authorized government agencies for monitoring contamination in environmental media, i.e., the air, water, and soil, and specifically authorized government agencies for monitoring food quality and human health.

### 3.3.14.2 Planned activities for facilitating or improving exchange of information

For the successful implementation of all obligations under the Stockholm Convention in BiH, the Action Plan for facilitating or undertaking information exchange and stakeholder involvement has identified specific measures and activities which need to be carried out in accordance with the defined priorities and objectives.

According to Article 11 of the Stockholm Convention, all Parties are required to facilitate or undertake the exchange of information relevant to: (a) the reduction or elimination of the production, use and release of POPs; and (b) alternatives to POPs, including information relating to their risks as well as to their economic and social costs. Therefore, the main objective of the information exchange program is to establish and maintain a system of

exchange, which will enable the exchange of information on the production, use and release of POPs, alternatives to POPs, including information on the harmful properties, and the financial and social costs that may be caused by such substances.

Parties to the Convention may exchange such information directly or through the Convention Secretariat. To achieve this objective, the National Focal Point in BiH - the Ministry of Foreign Trade and Economic Relations of BiH, should serve as a link between the Convention Secretariat and all the competent institutions in BiH, FBiH, RS and BD and other stakeholders, and participate in the exchange of information at the international and national level. The Ministry of Foreign Trade and Economic Relation is hence the responsible institution for the implementation of the information exchange program.

The information exchange program needs to be based on:

- Information exchange at the international level;
- Information exchange within BiH.

Exchange of information at the international level involves the exchange of information between Parties to the Convention and international organizations and forums, whereas at the national level such exchange of information involves the provision of timely and accurate

*Table 180:  
Action plan 3.3.14:  
Facilitating or  
undertaking information  
exchange*

Action Plan 3.3.14: Facilitating or undertaking information exchange		
Objectives	Activities	Time frame
<b>Main Objective 1. The establishment of an effective system of information exchange between relevant institutions in the FBiH, RS and BD and the National Focal Point</b>		
<b>Specific Objective 1.1</b> Strengthened mechanism of exchange of information between competent authorities horizontally (between entities and BD) and vertically (between entities, BD and state)	<b>Activity 1.1.1</b> Ensure mechanism of exchange of information about POPs with National Focal Point	2015
	<b>Activity 1.1.2</b> Oblige institutions to collect, exchange information and send them to the database at the entity, BD and BiH level. This includes the development of the <i>Procedure for Reporting on POPs to the National Focal Point</i> which needs to include: <ul style="list-style-type: none"> <li>▪ The reporting periods;</li> <li>▪ The content and format of the data submission form;</li> <li>▪ The communication scheme with the defined contact persons from each institution.</li> </ul>	2015
	<b>Activity 1.1.3</b> Develop a procedure for exchange of information between the entity ministries and BD Government	2016
	<b>Activity 1.1.4</b> Improve the system for exchange of information between civil society, government and institutions that are designated as competent and responsible for the implementation of the Stockholm Convention, monitoring of unintentionally produced POPs, and assessment of their impact on health and the environment	2016
	<b>Activity 1.1.5</b> Collect, update and process data sent by the competent authorities at entity and BD levels, and deliver them to the Convention Secretariat within the reporting obligations, and correspond otherwise with the Secretariat	2016 and onwards in line with the requirements of the Convention
<b>Expected commencement of implementation of the action plan</b>		
<b>Duration of the implementation of the action plan</b>		
<b>Total estimated required financial resources</b>		

### 3.3.15 ACTION PLAN: PUBLIC AWARENESS, INFORMATION AND EDUCATION (ARTICLE 10)

#### 3.3.15.1 Objectives of public awareness, information and education

The main objective of this Action Plan is to define the programme of informing and educating the public about POPs chemicals in accordance with the Stockholm Convention and thus raise public awareness. In addition to the obligations under Article 10 of the Convention, education and raising public awareness among the general public and target groups is foreseen in strategic documents concerning environmental protection in BiH as well. The Environmental Protection Strategy of FBiH and the Nature Protection Strategy of RS particularly emphasize the perceived need for institutional strengthening through formal and informal forms of education and training.

information to all stakeholders with regard to POPs (competent ministries, agencies, NGOs, professional associations, etc.).

Communication with the Convention Secretariat on behalf of BiH is the responsibility of the National Focal Point, i.e., the Ministry of Foreign Trade and Economic Relations of BiH.

In order to ensure a clearly defined mechanism for information/data exchange within BiH, the Ministry of Foreign Trade and Economic Relations of BiH needs to, in cooperation with the competent entity institutions, develop the *Procedure on Reporting on POPs to the National Focal Point* which needs to include:

- The reporting periods;
- The content and format of the data submission form;
- The communication scheme with the defined contact persons from each institution.

The Procedure will be adopted by the Council of Ministers of BiH, on the basis of prior consent provided by the Governments of FBiH, RS and BD.

The reporting process is more described in more detail in Chapter 3.3.17. Reporting.

Competent institution/organization	Stakeholders	Estimated financial resources
MoFTER in cooperation with competent entity institutions	All institutions involved	Regular activities within budget BiH: 15,000 BAM
MoFTER in cooperation with competent entity institutions	All institutions involved	Regular activities within budget BiH: 15,000 BAM
BiH: - FBiH: FMET RS: MPPCEE BD: BD Government	Other relevant state and entity ministries and departments in BD Government	Regular activities within budget FBiH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
BiH: MoFTER FBiH: FMET RS: MPPCEE BD: DSPPA	Institutes, laboratories and institutions nominated to conduct monitoring on the level of BiH; Entities, cantons and BD; Commercial entities; NGOs, Civil society	Regular activities within budget
MoFTER in cooperation with competent entity and BD institutions, according to <i>Procedure for Reporting on POPs to the National Focal Point</i>	-	Regular activities within budget
<b>Upon the adoption of the NIP</b>		
<b>2015 -2016</b>		
<b>45,000 BAM (BiH: 30,000 BAM, FBiH: 5,000 BAM, RS: 5,000 BAM, BD: 5,000 BAM)</b>		

All education programs should be oriented towards the selected target groups, i.e. the general public, industry, governments, decision-makers, in order to train them for the proper handling of POPs materials/chemicals.

Taking into account the negative effects that POPs chemicals may have on the environment and health, as well as the need to establish systems for their proper management, awareness raising of decision makers, executive government, employees and the general public regarding the use of POPs in BiH is a prerequisite for their successful management.

Table 181 gives an overview of the main and specific objectives of public awareness, information and education that need to be achieved in order to ensure the implementation of the Stockholm Convention in BiH.

*Table 181:  
Main and specific  
objectives of public  
awareness, information  
and education*

**Public awareness, information and education (Article 10): Main and specific objectives**

**Main Objective 1. Education and raising awareness of the public and target groups**

Specific objectives:

1. Developed effective instruments for information on POPs chemicals
2. Identified stakeholders actively involved in the management and decision-making relevant to the implementation of the Stockholm Convention
3. Activities undertaken to educate and raise awareness among target groups (decision makers, executives, industry, public) on obligations under the Convention (developed and implemented non-cyclical aspects of education as a form of lifelong learning, starting from university specialization to tailor-made courses aimed at employees of bodies administration, institutions nominated for the implementation of certain segments of the Stockholm Convention, as well as employees in the industry)
4. Design and implementation of formal university education of I and in particular, II and III cycle that would be related to the understanding of structures of chemicals and their impact on wildlife, management of chemicals, management of waste generated from the use of chemicals, and monitoring the concentration of POPs in the environment, living organisms and human food

**Main Objective 2. Providing public access to all information related to the implementation of the Stockholm Convention, the monitoring results and the results of medical studies on the potential impacts of POPs on the population in BiH**

Specific objectives:

1. Developed system of information and cooperation among relevant governmental institutions nominated by law as responsible and accountable for enforcement of obligations under the Stockholm Convention, the public sector, NGOs and the public
2. Comprehensive information on the Convention and environmental aspects, as well as information relating to monitoring results, exposure of humans and the environment and activity in reducing the formation and emission of POPs available to the public with adequate infrastructure of information management

### 3.3.15.2 Planned activities for public awareness, information and education

According to Article 10 of the Stockholm Convention, Parties are obliged, within their capabilities, to promote and facilitate:

- a. Awareness among its policy and decision makers with regard to POPs;
- b. Provision to the public of all available information on POPs;
- c. Development and implementation, especially for women, children and the least educated, of educational and public awareness programmes on POPs, as well as on their health and environmental effects and on their alternatives;
- d. Public participation in addressing POPs and their health and environmental effects and in developing adequate responses, including opportunities for providing input at the national level regarding implementation of this Convention;
- e. Training of workers, scientists, educators and technical and managerial personnel;
- f. Development and exchange of educational and public awareness materials at the national and international levels; and
- g. Development and implementation of education and training programmes at the national and international levels.

The objective the action plan on raising awareness, informing and educating the public regarding POPs chemicals, products and waste containing these chemicals is to prevent the incorrect and avoidable use of such products, through training of staff and direct users who handle these chemicals, products or waste. In this sense, one of the significant regulations that have already been adopted is the *Regulation on the Duties of Users of Phytopharmaceutical Agents* adopted by the Council of Ministers at its 26<sup>th</sup> session held on 12 November 2012, and published in the "Official Gazette of BiH" No. 101/12. This Regulation sets out the general and specific duties of the users of phytopharmaceutical agents, with the aim of preventing the possibility of poisoning humans, and contaminating the environment and agricultural products. Another significant regulation is the *Regulation on Principles of Good Agricultural Practices, Integrated Plant Protection and the Duties of Users of Plant Protection Products* ("Official Gazette of RS", No. 90/13). For this purpose, it is necessary to provide continuous education to the users of all substances and products containing or likely to contain POPs chemicals.

Competent institutions in BiH, FBiH, RS and BD dealing with environmental and health protection, need to **ensure the availability of information** in accordance with the legislation as well as in accordance with the requirements of the Stockholm Convention. The main objective of the public availability of information is to establish a higher degree of democratization within the system of decision-making regarding the protection and use of natural resources. Furthermore, this ensures the involvement of the representatives of local communities who play an invaluable role in improving public administration, and also affects the commercial entities whose inappropriate activities can lead to contamination of the environment.

Informing the civil sector about the issues that may emerge in case the management of POPs is not adequately organized, and motivating the civil sector to undertake greater action, both towards potential polluters and holders of power, is expected to result in a powerful tool for the civil society in promoting environmentally friendly solutions and generally prevent health damage to the individuals and the society. It is therefore necessary to conduct further training and motivation of the civil society and civic associations, to enable them access to all the relevant information concerning the Stockholm Convention, POPs chemicals and monitoring results, in order for the civil society to achieve its role of in promoting environmental protection.

It is essential for the competent institutions in FBiH, RS and BD, primarily the ministries responsible for education and the ministries responsible for environmental and health protection, to ensure in accordance with the relevant entity regulations governing the field of education, the **introduction of educational programs** related to raising awareness and understanding the problem of POPs, from primary schools and secondary schools to the education and sensitization of the entire society. At the same time, there is a need for formal education through cyclical education in accordance with the principles of the Bologna process, but also through lifelong learning programs<sup>188</sup> which would be aimed at raising the knowledge and competence of staff in the institutions responsible for the implementation of the Stockholm Convention. It is precisely this form of education that can be carried out within a shorter or longer period of time, through workshops, seminars or lectures organized within the framework of academic specializations, which represents the ideal means of educating people who come into contact with POPs chemicals through their everyday work activities. Lifelong learning programs taught in this manner are also an ideal model for the education of employees in administration bodies of the executive, legislative and judicial authorities. The fact that there is already a number of different programs that offer education in the fields of ecology, environmental protection and risk management represents the basis for organizing formal multidisciplinary studies at the postgraduate (master) level of education and doctoral studies, which would enable the students to acquire knowledge and develop skills to address any issues related to the Basel, the Rotterdam and Stockholm Convention.

In addition, the competent institutions in BiH, FBiH, RS and BD dealing with environmental and health protection should ensure **professional training of staff** in organizations that handle goods (products), which may contain POPs chemicals (importers, inspection authorities), as well as to ensure the training of employees in industry and agriculture where POPs chemicals were used.

For the successful implementation of all obligations under the Stockholm Convention in BiH, the Action Plan for public awareness, information and education (Table 182) has identified specific measures and activities which need to be carried out in accordance with the defined priorities and objectives.

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<sup>188</sup> Lifelong learning requires the integration of formal, non-formal and informal learning in order to enable continuous improvement of quality of life.

Table 182:  
Action Plan 3.3.15:  
Public awareness,  
information and  
education (Article 10)

Action Plan 3.3.15: Public awareness, information and education (Article 10)		
Objectives	Activities	Time frame
<b>Main Objective 1. Education and raising awareness of the public and target groups</b>		
<b>Specific Objective 1.1</b> Developed effective instruments for information on POPs chemicals	<b>Activity 1.1.1</b> Prepare a detailed plan to inform the public about the impacts of POPs, which will define specific programs to raise awareness and educate the public, and which will include, not limited to: <ol style="list-style-type: none"> <li>The types of programs for <b>different stakeholders</b> (general public, vulnerable groups, workers, educators, NGOs, persons responsible for POPs issues within the competent institutions, persons dealing with POPs management and management of POPs containing waste, etc.),</li> <li>The guidelines for education and training,</li> <li>The guidelines for materials to be prepared,</li> <li>The number of programs to be organized,</li> <li>The expected results of the conducted programs.</li> </ol>	2015
	<b>Activity 1.2.1</b> Implement programs to raise awareness and educate the public (described above under the "develop effective instruments for information on POPs chemicals)": <b>organization of seminars and workshops</b> for the sound management of POPs chemicals at various POPs groups for capacity-building of industry, administration, executive, legislative and judicial authorities and other stakeholders, including the <b>preparation of educational materials</b>	2015 – 2017
<b>Specific Objective 1.2</b> Identified stakeholders actively involved in the management and decision-making relevant to the implementation of the Stockholm Convention	<b>Activity 1.2.2</b> Organize periodic meetings and workshops inviting citizens to participate and where qualified persons would talk about POPs: what they are, where to find them, how dangerous they are, the latest information about POPs in BiH, sources of POPs... Such events and workshops should be organized in an attractive and interesting manner, with presentations which should later be published through public networks. The invitations should be distributed through advertisements, billboards and flyers. Such events should be organized on the whole territory of BiH, and rural areas should not be neglected.	2015 and continually thereafter
	<i>Specific programs of education and awareness raising for particular target groups in accordance with particular POPs chemicals are defined in individual Action Plans.</i>	
<b>Specific Objective 1.3</b> Activities undertaken to educate and raise awareness among target groups (decision makers, executives, industry, public) on obligations under the Convention (developed and implemented non-cyclical aspects of education as a form of lifelong learning, starting from university specialization to tailor-made courses aimed at employees of bodies administration, institutions nominated for the implementation of certain segments of the Stockholm Convention, as well as employees in the industry)	<b>Activity 1.3.1</b> Prepare and distribute <b>information materials</b> on POPs chemicals for different population groups (children, youth, the general public, etc.)	2016
	<b>Activity 1.3.2</b> Prepare and distribute a <b>manual for professional and technical persons</b> on the identification and safe handling and management of hazardous waste containing POPs chemicals	2015
	<b>Activity 1.3.3</b> Develop and implement <b>programs for further education of teachers</b> for Nature and the Society for the lower elementary grades, and courses of Biology and Chemistry for higher grades of elementary school and secondary school, whereby they would be introduced to the public health problem of POPs substances and their impact on the environment, and motivate students and direct them towards understanding the principles of sustainable development, the reduction of waste production (especially those containing POPs) and generally caring for the environment. Education programs should be tailored to the level of students' knowledge to which teachers need to convey this knowledge.	2015 – 2017
	<b>Activity 1.3.4</b> Launch programs whereby students in the upper grades of elementary school (8 <sup>th</sup> , 9 <sup>th</sup> grade), through chemistry and biology, would be introduced to POPs, their sources and harmful effects on health	Academic year 2015/2016 and continually thereafter
	<b>Activity 1.3.5</b> Launch programs whereby secondary school students would be introduced, through chemistry and biology and other courses (depending on concentration), related to POPs, their chemical properties, sources and harmful effects on health and the environment	Academic year 2015/2016 and continually thereafter
	<b>Activity 1.3.6</b> Develop <b>lifelong learning programs</b> at the level of university specialization that would represent a form of lifelong learning and a way of acquiring additional qualifications for persons who are members of previously identified target groups	2016 – 2018
	<b>Activity 1.3.7</b> Organize <b>periodic public surveys</b> on awareness of the effects of POPs for the purpose of public opinion polls and level of public awareness	2015 - periodically

	Competent institution/organization	Stakeholders	Estimated financial resources
	MoFTER (with recruitment of an expert team)	Public administration, industry, general public, vulnerable groups, civil sector	BiH: 30,000 BAM Funds necessary for the recruitment of expert consultants.
	MoFTER in cooperation with entity ministries for environmental protection	Public administration, industry, civil sector	Regular activities within budget BiH: 30,000 BAM FBiH: 30,000 BAM RS: 30,000 BAM BD: 10,000 BAM
	- Environmental protection departments of local self-government units - Scientific and education institutions - NGOs	General public	Regular activities within budget FBiH: 20,000 BAM RS: 20,000 BAM BD: 10,000 BAM
	Entity ministries for environmental protection in cooperation with ministries for health protection and ministries for education	General public, civil sector	Regular activities within budget FBiH: 4,000 BAM RS: 4,000 BAM BD: 2,000 BAM
	Entity ministries for environmental protection in cooperation with ministries for industry and ministries for education	Industry; Inspection authorities	Regular activities within budget FBiH: 8,000 BAM RS: 8,000 BAM BD: 4,000 BAM
	Ministries for education (entity level, as well as cantonal level in FBiH) in cooperation with entity ministries for environmental protection	Teachers/professors in primary and secondary schools	Regular activities within budget FBiH: 10,000 BAM RS: 10,000 BAM BD: 5,000 BAM
	Ministries for education (entity level, as well as cantonal level in FBiH) in cooperation with entity ministries for environmental protection	Students of 8 <sup>th</sup> and 9 <sup>th</sup> grades	Regular activities within budget FBiH: 4,000 BAM RS: 4,000 BAM BD: 2,000 BAM
	Ministries for education (entity level, as well as cantonal level in FBiH) in cooperation with entity ministries for environmental protection	Students of secondary schools	Regular activities within budget FBiH: 4,000 BAM RS: 4,000 BAM BD: 2,000 BAM
	Ministries for education (entity level, as well as cantonal level in FBiH) in cooperation with entity ministries for environmental protection	Experts in the field of environmental protection	Regular activities within budget FBiH: 5,000 BAM RS: 5,000 BAM BD: 5,000 BAM
	Entity ministries for environmental protection in cooperation with ministries for health	General public	Regular activities within budget FBiH: 4,000 BAM RS: 4,000 BAM BD: 2,000 BAM

Action Plan 3.3.15: Public awareness, information and education (Article 10)		
Objectives	Activities	Time frame
<b>Specific Objective 1.4</b> Design and implementation of formal university education of I and in particular, II and III cycle that would be related to the understanding of structures of chemicals and their impact on wildlife, management of chemicals, management of waste generated from the use of chemicals, and monitoring the concentration of POPs in the environment, living organisms and human food	<b>Activity 1.4.1</b> Include questions about POPs chemicals in the <b>official educational programs</b> of formal university education under 1 <sup>st</sup> cycle: the studies related to environmental protection (concentration at natural sciences schools, technology, ecology ...) introduce systematic and detailed introduction to POPs: structure, obtaining, identification, impact on health and the environment through courses related to chemistry and elective courses	Academic year 2015/2016 and continually thereafter
	<b>Activity 1.4.2</b> Prepare and implement interdisciplinary 2 <sup>nd</sup> and 3 <sup>rd</sup> cycle studies that address environmental issues, public health issues and contamination of food, water, biomes and POPs; scholarships for students of the 3 <sup>rd</sup> cycle related to POPs	Academic year 2015/2016 and continually thereafter
<b>Main Objective 2. Providing public access to all information related to the implementation of the Stockholm Convention, the monitoring results and the results of medical studies on the potential impacts of POPs on the population in BiH</b>		
<b>Specific Objective 2.1</b> Developed system of information and cooperation among relevant governmental institutions nominated by law as responsible and accountable for enforcement of obligations under the Stockholm Convention, the public sector, NGOs and the public	<b>Activity 2.1.1</b> <b>Nominate an institution</b> at the state level that would be responsible for the collection, classification and disclosure of information related to POPs, primarily monitoring results. Develop a precisely defined procedure for obtaining relevant information from all institutions and bodies involved in the activity related to POPs	2015
	<b>Activity 2.2.2</b> <b>Establish and regularly update the website</b> where the previously nominated institutions published all relevant information related to the Stockholm Convention and POPs as such, and the situation related to POPs chemicals in BiH	2015 - and continually thereafter
<b>Specific Objective 2.2</b> Comprehensive information on the Convention and environmental aspects, as well as information relating to monitoring results, exposure of humans and the environment and activity in reducing the formation and emission of POPs available to the public with adequate infrastructure of information management	<b>Activity 2.2.3</b> Publish: <ol style="list-style-type: none"> <li>i. <b>National Implementation Plan</b> for the Stockholm Convention</li> <li>ii. <b>Online Information on POPs chemicals</b>, as well as information on the obligations of BiH arising from the Stockholm Convention</li> <li>iii. <b>Information concerning the collection and disposal of waste</b> containing POPs chemicals</li> <li>iv. <b>Information about the Aarhus Convention</b> and the Right of Access to Information, Public Participation in Decision-making and access to justice in environmental matters</li> </ol>	Upon the adoption of NIP, and periodically thereafter
	<b>Activity 2.2.4</b> Public TV stations: <b>broadcasting educational and scientific shows intended for children</b> in prime time on POPs substances (shows can be taken from foreign channels, but also recorded with local experts)	2015 and continually thereafter
	<b>Activity 2.2.5</b> Public TV stations: <b>broadcasting educational and scientific shows intended for adults</b> in prime time on POPs substances (shows can be taken from foreign channels, but also recorded with local experts) with the following topics: <ol style="list-style-type: none"> <li>i. what POPs are, where they can be found, how hazardous they are</li> <li>ii. the most recent findings and locations of POPs sources in BiH</li> </ol>	2015 and continually thereafter
	<b>Activity 2.2.6</b> Publish articles on "prime" locations (front page) in daily newspapers (Oslobodjenje, Dnevni Avaz, Nezavisne Novine, Glas Srpske, ...) and web portals on POPs and the latest discoveries and places where POPs were found in BiH	2016 and continually thereafter
Expected commencement of implementation of the action plan		
Duration of the implementation of the action plan		
Total estimated required financial resources		



	Competent institution/organization	Stakeholders	Estimated financial resources
	Ministries for education (entity level, as well as cantonal level in FBiH) in cooperation with entity ministries for environmental protection	Students	Regular activities within budget FBiH: 10,000 BAM RS: 10,000 BAM BD: 5,000 BAM
	Ministries for education (entity level, as well as cantonal level in FBiH) in cooperation with entity ministries for environmental protection and ministries for health	Experts in the field of environmental protection	Regular activities within budget FBiH: 10,000 BAM RS: 10,000 BAM BD: 5,000 BAM
	MoFTER	General public	Regular activities within budget
	Nominated institution		Regular activities within budget of BiH: 10,000 BAM
	MoFTER; Entity ministries for environmental protection; Entity ministries for health protection; Aarhus Centres	General public	Regular activities within budget
	Public TV Service Providers	Children and youth	BiH: 3,750 BAM FBiH: 3,750 BAM RS: 3,750 BAM BD: 3,750 BAM
	Public TV Service Providers	General public	BiH: 3,750 BAM FBiH: 3,750 BAM RS: 3,750 BAM BD: 3,750 BAM
	Entity ministries for environmental protection	General public	Regular activities within budget FBiH: 3,500 BAM RS: 3,500 BAM BD: 3,000 BAM
<b>Upon the adoption of the NIP</b>			
<b>3 years (and continually thereafter)</b>			
<b>380,000 BAM (BiH: 77,500 BAM, FBiH: 120,000 BAM, RS: 120,000 BAM, BD: 62,500 BAM)</b>			

### 3.3.16 ACTION PLAN: EFFECTIVENESS EVALUATION (ARTICLE 16)

The Secretariat of the Stockholm Convention has established a framework for evaluating the effectiveness of the implementation of the Stockholm Convention in accordance with Article 16 of the Convention.

The purpose of effectiveness evaluation is to assess the effectiveness of the Convention in protecting human health and the environment against POPs substances, and to assess the effectiveness of the implemented measures taken by Parties to the Convention in order to fulfil this purpose<sup>189</sup>.

The Convention Secretariat conducts effectiveness evaluation on the basis of:

- National implementation plans submitted to the Convention Secretariat in accordance with Article 15,
- Information on non-compliance with the provisions of the Convention in accordance with Article 17,
- Regional monitoring plans.

The first cycle of evaluation for the period of six years (between 2010 and 2017) is underway, and the Conference of the Parties will, at the eighth meeting to be held in 2017, evaluate the effectiveness of the implementation of the Stockholm Convention by the Parties to the Convention.

In order to provide data to the Conference of the Parties on the monitoring of the presence of the chemicals listed under Annexes A, B and C and their allocation, the Ministry of Foreign Trade and Economic Relations of BiH will report to the Secretariat of the Stockholm Convention in accordance with Chapter 3.3.17.

### 3.3.17 ACTION PLAN: REPORTING

In accordance with the requirements of the Stockholm Convention, each party is required to designate a national focal point for communication and reporting of information through the Convention Secretariat relevant to the reduction or elimination of the production, use and release of POPs and alternatives to POPs, including information relating to their risks as well as to their economic and social costs.

The Ministry of Foreign Trade and Economic Relations BiH was appointed as the focal point for coordination of cooperation with international structures and bodies of the Stockholm Convention.

Table 183 provides an overview of the reporting requirements in accordance with the provisions of the Stockholm Convention.

*Table 183:  
Reporting requirements  
in accordance with  
the provisions of the  
Stockholm Convention*

Requirement of the Convention	Description	Period
Article 5, Paragraph (a) (v): Measures to reduce or eliminate releases from unintentional production (Annex C)	Requires an overview of the strategies and their effectiveness in reducing or eliminating releases from unintentional production. The overviews need to be included in the reports submitted pursuant to Article 15 of the Convention.	Every 5 years
Article 15: Reporting	Each Party shall report to the Conference of the Parties on the measures it has taken to implement the provisions of the Convention and on the effectiveness of such measures in meeting the objectives of the Convention. Each Party shall provide to the Secretariat: <ul style="list-style-type: none"> <li>▪ Statistical data on its total quantities of production, import and export of each of the chemicals listed in Annex A and Annex B; and</li> <li>▪ To the extent practicable, a list of the States from which it has imported each such substance and the States to which it has exported each such substance.</li> </ul>	To be decided by the Conference of the Parties

<sup>189</sup> Effectiveness evaluation: Framework for evaluating the effectiveness of the Stockholm Convention pursuant to Article 16 (UNEP/POPS/COP.6/27/Add.1/Rev.1)

Requirement of the Convention	Description	Period
Article 16: Effectiveness evaluation	The Conference of the Parties shall, at its first meeting, initiate the establishment of arrangements to provide itself with comparable monitoring data on the presence of the chemicals listed in Annexes A, B and C as well as their regional and global environmental transport. The evaluation shall be conducted on the basis of available scientific, environmental, technical and economic information, including: <ul style="list-style-type: none"> <li>▪ Reports and other monitoring information provided pursuant to paragraph 2 of Article 16 (results of the monitoring activities on a regional and global basis);</li> <li>▪ National reports submitted pursuant to Article 15; and</li> <li>▪ Non-compliance information provided pursuant to the procedures established under Article 17.</li> </ul>	Commencing four years after the date of entry into force of the Convention, and periodically thereafter
Annex A, Part II, Paragraph (g)	Each party shall provide a report every five years on progress in eliminating polychlorinated biphenyls and submit it to the Conference of the Parties pursuant to Article 15;	Every 5 years
Annex A, Part IV, Paragraph 2 and Annex A, Part V, Paragraph 2	At its sixth ordinary meeting and at every second ordinary meeting thereafter, the Conference of the Parties shall evaluate the progress that Parties have made towards achieving their ultimate objective of elimination of hexabromodiphenyl ether and heptabromodiphenyl ether contained in articles and review the continued need for this specific exemption. This specific exemption shall in any case expire at the latest in 2030.	Every 4 years (according to the Effectiveness Evaluation Framework of the Stockholm Convention)
Annex B, Part II, Paragraph 4	Each Party that uses DDT shall provide to the Convention Secretariat information on the amount used, the conditions of such use and its relevance to that Party's disease management strategy, in a format to be decided by the Conference of the Parties in consultation with the World Health Organization.	Every 3 years
Annex B, Part III, Paragraph 3	Each Party that uses and/or produces these chemicals shall report on progress made to eliminate PFOS, its salts and PFOSF and submit information on such progress to the Conference of the Parties pursuant to and in the process of reporting under Article 15 of the Convention.	Every 4 years

Entity ministries (and BD Government Departments) in charge of the following areas:

- Environmental protection,
- Health,
- Agriculture, Water Management and Forestry, and
- Energy, Mining and Industry

are responsible for collecting all relevant data (Table 183), within their jurisdiction, essential for the development of periodic reports in accordance with the provisions of the Stockholm Convention.

Information will be submitted to the Ministry of Foreign Trade and Economic Relations of BiH, which will prepare periodic reports and submit these to the Convention Secretariat. Due to the fact that the information submission mechanism is currently not regulated by laws or by-laws, and in order to establish a clearly defined mechanism for submission of data/information, the Ministry of Foreign Trade and Economic Relations of BiH (in cooperation with the competent institutions in FBiH, RS and BD) is required to develop the *Procedure for Reporting on POPs to the National Focal Point*. The Procedure is adopted by the Council of Ministers of BiH, on the basis of prior consent provided by the Governments of FBiH, RS and BD.

The Ministry of Foreign Trade and Economic Relations of BiH, as the focal point for the Stockholm Convention, will:

- Collect all information needed to develop reports by competent entity ministries and BD Government Departments during the implementation of the NIP;
- Analyse the received data, and prepare comprehensive periodic reports as required by the Convention;
- Submit the periodic reports to relevant national and international institutions, organizations and agencies;
- Submit the periodic reports, in the specified reporting format, the Secretariat of the Stockholm Convention.

The system of reporting to the Convention Secretariat should be developed after the reporting methods and procedures are determined at the 1<sup>st</sup> Conference of the Parties. This system should include mechanisms needed to evaluate effectiveness and the format for submission of reports.

### 3.3.18 ACTION PLAN: RESEARCH, DEVELOPMENT AND MONITORING (ARTICLE 11)

#### 3.3.18.1 Objectives of research, development and monitoring

The main objective of this Action Plan is to provide information on the presence of POPs in the air, water, living organisms, food and soil to public authorities, local and international institutions responsible for the enforcement of environmental protection and public health policies, the scientific community and the general public, and to enable the assessment of the impacts of these pollutants particularly on the members of specific and sensitive populations. This objective should be achieved through regular institutional monitoring measures, and the implementation of scientific and research projects.

Table 184 provides an overview of the priority areas in the field of research, development and monitoring, as well as the objectives to be achieved in order to ensure the implementation of the Stockholm Convention in BiH.

*Table 184:  
Main and specific  
objectives for research,  
development and  
monitoring*

Research, development and monitoring - Main and specific objectives
<p><b>Main Objective 1: Strengthening capacities for monitoring of POPs substances in the environment and humans</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Strengthen/build capacity for timely and systematic monitoring of POPs substances in air, water, food, living organisms and soil</li> <li>2. Institutions which have been assigned responsibility and accountability for monitoring of POPs should make preparations to ensure the accreditation of the laboratory according to BAN ISO / IEC 17025 and implementation of the Principles of Quality Assurance and Good Laboratory Practice</li> <li>3. Enable the acquisition of knowledge, skills and competences and their transfer to the bodies responsible for carrying out monitoring of POPs by funding research projects that would be realized in scientific research and higher education institutions in BiH</li> <li>4. Designed, adopted and implemented monitoring programs of POPs in bodily fluids and biological material of human and animal origin, and in food and the working environment</li> </ol>
<p><b>Main Objective 2: Monitoring of waste and sites potentially contaminated with POPs compounds (so-called hot-spots)</b></p> <p>Specific objectives:</p> <ol style="list-style-type: none"> <li>1. Detailed inventory and monitoring of areas potentially contaminated with POPs in BiH</li> <li>2. Risk assessment conducted and conclusions made on public health impact of population's exposure to POPs</li> </ol>

#### 3.3.18.2 Planned activities for research, development and monitoring

In line with Article 11 of the Convention, the Parties shall, within their capabilities, at the national and international levels, encourage and/or undertake appropriate research, development, monitoring and cooperation pertaining to POPs and, where relevant, to their alternatives and to candidate POPs, including on their:

- Sources and releases into the environment;
- Presence, levels and trends in humans and the environment;
- Environmental transport, fate and transformation;
- Effects on human health and the environment;
- Socio-economic and cultural impacts;
- Release reduction and/or elimination; and
- Harmonized methodologies for making inventories of generating sources and analytical techniques for the measurement of releases.

For the successful implementation of all obligations under the Stockholm Convention in BiH, the Action Plan for research, development and monitoring has identified specific measures and activities which need to be carried out in accordance with the defined priorities and objectives.

Main Objective 1: Strengthening capacities for monitoring of POPs substances in the environment and humans

### Specific Objective 1.1 Strengthen/build capacity for timely and systematic monitoring of POPs substances in air, water, food, living organisms and soil

The development of a functional, harmonized and enforceable legal framework is a prerequisite for all activities under the Action Plan for research, development and monitoring.

It is absolutely essential, as soon as possible, to adopt the laws and bylaws which have been identified as lacking at the level of FBiH and BD, and to harmonize and revise all the relevant laws and bylaws at entity, cantonal and BD level without which it is impossible to perform continuous monitoring and control of the import, production, transport, use, disposal and destruction of POPs, as well as products and wastes containing POPs. It is also necessary to adopt the appropriate EU legislation concerning the maximum permissible concentrations of POPs in the air, water, living organisms, food and soil/land, and the methods of their analysis using applicable documents (e.g. *Guidance for Analysis of Persistent Organic Pollutants* (POPs), UNEP Chemical Branch DTIE, March 2007; *Principles of Good Laboratory Practice*, OECD 1998).

In addition to the aforementioned fragmentation and overlapping of responsibilities with regard to the monitoring of POPs substances in the environment<sup>190</sup>, an issue that needs to be addressed in order to enable the activities foreseen in the Action Plan for research, development and monitoring, but also other action plans, is coordination between the institutions (Table 145) responsible for the collection, sorting and organizing data on the results of monitoring of POPs in the environment, releases of POPs compounds in the environment, and the disposal of waste containing POPs, as well as making such data accessible to the public. Namely, during inventory development, the Environment, Health, Research and Development Group found that there are monitoring results that have not been made available to the general public (Chapter 2.3.9.5). In addition, it should be noted that the reduction of POPs emissions in the environment and the identification of potentially contaminated areas cannot be monitored without the existence of a single database on the results of monitoring of emissions from industrial sources, monitoring of POPs in the air, drinking water, surface water and groundwater, living organisms, sediment and soil/land, the biome and human biomaterial. This is also a requirement set out in the Article 11, Paragraph 2, items (e) and (f) of the Stockholm Convention, and therefore it is necessary to eliminate all the legal formalities which could conceivably obstruct and impede the establishment of such a single database, as assumed international obligations have priority over national legislation.

An institution responsible for biome monitoring in the entities and BD needs to be appointed in order to overcome the gaps identified during the inventory development, to fulfil the obligations under the Stockholm Convention, and to enable the monitoring of the environmental transport of POPs substances and their effects on human health and the environment (Article 11, paragraph 1, items (c) and (d)).

### Specific Objective 1.2 Institutions which have been assigned responsibility and accountability for monitoring of POPs should make preparations to ensure the accreditation of the laboratory according to BAN ISO / IEC 17025 and implementation of the principles of quality assurance and good laboratory control

Ensuring adequate conditions pertaining to staff, equipment and facilities within the institutions appointed for carrying out monitoring is another prerequisite for the implementation of this Action Plan. The Ministry of Foreign Trade and Economic Relations of BiH, as the institution responsible for coordinating the implementation of the Convention in BiH, needs to initiate the provision of financial resources from international programs that finance environmental projects, such as the GEF. During the inventory development, it was ascertained that institutionally organized monitoring is carried out only to a limited extent, periodically and in accordance with the available financial resources as a result of lack of adequate equipment, but also an inadequate monitoring plan which would fulfil the requirements of Article 11 of the Stockholm Convention. It is necessary for the competent authorities to harmonize the existing monitoring plans with the requirements of the Convention, and to ensure sufficient material, technical and human resources for the implementation of such plans, ranging from laboratory equipment, staff training, to the process of certification and accreditation in accordance with the BAN ISO/IEC 17025 standards.

It is necessary for the appointed institution(s) to provide training in order to enable the laboratories to prepare for the certification and accreditation process, develop the appropriate

<sup>190</sup> During the analysis of the institutional framework for the management of POPs in BiH, certain gaps, overlaps and duplications of responsibilities and functions were identified. For example, the entity level public health institutes are responsible for determining contamination in food, which is also the responsibility of the Food Safety Agency and Veterinary Office of BiH. On the other hand, there are certain obligations that are not yet being fulfilled, such as biome monitoring. According to the entity laws governing health care, the responsibilities of the entity level public health institutes include testing, monitoring, analysing and evaluating the impact of environmental factors on human health. At the same time, all working groups concluded that there is a significant discrepancy (in the number and type of adopted laws and bylaws) in the field of environmental protection and chemicals management, with regard to the competences of BiH, entities and BD

documentation, and introduce quality assurance systems. The basic requirements that must be met in order to fulfil the obligations set out by Article 11 (Paragraph 2, items (b) and (c)) of the Stockholm Convention are specified in the *Guidance for Analysis of Persistent Organic Pollutants (POPs)* (UNEP Chemical Branch DTIE, March 2007). It should be taken into account that there is equipment located in various institutions (Chapter 2.3.9.5) in BiH that may be put into operation, and thus the need for additional investment reduced.

Specific Objective 1.3 Enable the acquisition of knowledge, skills and competences and their transfer to the bodies responsible for carrying out monitoring of POPs by funding research projects that would be realized in scientific research and higher education institutions in BiH

In situations where certain activities stipulated in Article 11 of the Stockholm Convention are conducted periodically instead of continuously, such as developing and proposing analytical techniques for the measurement of releases (Article 11, Paragraph 1, item (g)), and conducting monitoring in living organisms and risk assessment of the effects of POPs substances on human health and the environment as such, it is reasonable to carry out these activities through projects that could be implemented with the participation of scientific and research institutions and higher education organizations. It should be emphasized that these activities can help strengthen the scientific and research capabilities in BiH, as required in Article 11, Paragraph 2, item (b), but also help fulfil other obligations under the Stockholm Convention. This primarily relates to strengthening of capacities to conduct risk assessments for which the RS Public Health Institute and the FBiH Public Health Institute have been nominated.

The competent institutions in FBiH, RS and BD should ensure the development of research institutions as well, particularly those located within universities, in order to create the preconditions for acquiring and applying the necessary knowledge, skills and competencies needed to fulfil all the obligations assumed by BiH under the Stockholm Convention (obligations under Article 11 of the Convention).

Specific Objective 1.4 Designed, adopted and implemented monitoring programs of POPs in bodily fluids and biological material of human and animal origin, and in food and the working environment

It is necessary for the entity ministries of health and the Government of BD to determine a plan of monitoring in food and working environment (the RS Ministry of Labour and the FBiH Ministry of Labour and Social Policy with regards to the working environment) which will include all POPs substances, in accordance with EU regulations.

The basic prerequisite for assessing effects of POPs on the population is the identification of the most vulnerable sections of the population, due to their geographical location, potential exposure, ethnic and socio-economic status. Studies focused on monitoring the presence and concentrations of certain POPs<sup>191</sup> in body fluids and breast milk in the manner carried out in other countries of the region that have adopted NIPs for the Stockholm Convention represent the first step in determining the effects of POPs on the population of Bosnia and Herzegovina. In parallel with these studies, it is essential that competent institutions in FBiH,

Table 185:  
Action Plan 3.3.18:  
Research, development  
and monitoring (Article  
11)

Action Plan 3.3.18: Research, development and monitoring (Article 11)		
Objectives	Activities	Time frame
<b>Main Objective 1: Strengthening capacities for monitoring of POPs substances in the environment and humans</b>		
<b>Specific Objective 1.1</b> Strengthen/build capacity for timely and systematic monitoring of POPs substances in air, water, food, living organisms and soil	<b>Activity 1.1.1</b> Adopt missing and update existing normative acts relating to chemicals in general and POPs substances in particular: i. Adopt laws on chemicals in the FBiH and the BD; ii. Determine the maximum allowable concentration of POPs substances in the air, drinking water, surface water, food, living organisms, soil and sediment; iii. Determine the maximum allowable concentration of POPs in waste water, waste, soil and sediment; iv. adopt relevant EU legislation related to the monitoring of POPs in food, drinking water, living organisms, water, soil and sediment	2015
	<b>Activity 1.1.2</b> Nominate institutions responsible for implementation of monitoring biomes in the Entities and BD	2015
<b>Specific Objective 1.2</b> Institutions which have been assigned responsibility and accountability for monitoring of POPs should make preparations to ensure the accreditation of the laboratory according to BAN ISO / IEC 17025 and implementation of the principles of quality assurance and good laboratory control	<b>Activity 1.2.1</b> Equipment, facilities and personnel necessary to perform given tasks are to be ensured in the institutions appointed for the implementation of monitoring	2016

191 Persistent Organic Pollutants In Human Milk Fact Sheet 4.3, December 2009 (World Health Organization)

RS and BD implement and evaluate the exposure of the population via air, drinking water and food, as well as professional and ambient exposure, and to determine the public health significance of such exposure (obligation under Article 11 of the Convention).

### Main Objective 2: Monitoring of waste and sites potentially contaminated with POPs compounds (so-called hot-spots)

Specific Objective 2.1 Detailed inventory and monitoring of areas potentially contaminated with POPs in BiH

This objective has been partially addressed within the *Strategy and Action Plan 3.3.13: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner*.

The competent institutions in FBiH, RS and BD need to establish a system for monitoring of areas contaminated with POPs following the detailed identification of areas that are (potentially) contaminated with POPs.

The competent institutions in FBiH, RS and BD, in coordination with MoFTER, need to develop long-term monitoring programs, which should define the exact sampling positions, the number and type of data to be monitored, the methodology, the quality control methods, and the time and frequency of reporting in order to meet the requirements of the Stockholm Convention. In addition, it is necessary that the relevant ministries in FBiH and RS, primarily the ministries of environmental protection, and the relevant BD Government Department, in coordination with MoFTER, develop a program for monitoring of unintentionally produced POPs from the industry, in order to allow for the monitoring of the impact of industries identified during the development of the preliminary inventory by the PCDD/PCDF Inventory Group as the largest emitters of PCDD/ PCDF.

Specific Objective 2.2 Risk assessment conducted and conclusions made on public health impact of population's exposure to POPs

The entity level ministries for environmental protection and the BD Government, in cooperation with the ministries of health in FBiH, RS and the BD Government, should ensure that the competent nominated institution carries out assessments of the impacts of contaminated sites on human health and the environment in the proximity of such sites (based on the experiences of other Parties to the Stockholm Convention), on the basis of which these institutions should identify the most vulnerable sections of the population and prepare an action plan to alleviate the effects of POPs on the target groups, but also on the population of BiH as a whole.

Action plan for research, development and monitoring (Table 185) includes the planned measures and activities that need to be implemented for the successful implementation of all obligations under the Stockholm Convention in BiH, identifies institutions responsible for their implementation, as well as the time frame and the estimated necessary funds.

	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: MoFTER, MCA FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Other authorities responsible for the quality, safety and protection of food, water, health and the environment	Regular activities within the budget
	BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	Other competent ministries in BiH, FBiH, RS and BD	Regular activities within the budget
	BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	Institutes, laboratories and institutions nominated for conducting monitoring at BiH, entity, canton and BD levels	FBiH: 864,000 BAM RS: 756,000 BAM BD: 180,000 BAM It is necessary to consider applying for funding from international financial mechanisms.

Action Plan 3.3.18: Research, development and monitoring (Article 11)		
Objectives	Activities	Time frame
	<b>Activity 1.2.2</b> Establish a plan for monitoring substances in the list of the Stockholm Convention in food, drinking water, environment, biome and places of waste disposal	2015
	<b>Activity 1.2.3</b> Conduct staff training related to quality assurance and implementation of good laboratory practice system	2016
	<b>Activity 1.2.4</b> The institutions nominated to carry out monitoring should prepare documentation relating to the quality and monitoring requirements for POPs. This documentation should include the standard operating procedures for sampling, analysis, interpretation and reporting of results.	2016
	<b>Activity 1.2.3</b> Provide funds for certification and accreditation of nominated laboratories	2016
<b>Specific Objective 1.3</b> Enable the acquisition of knowledge, skills and competences and their transfer to the bodies responsible for carrying out monitoring of POPs by funding research projects that would be realized in scientific research and higher education institutions in BiH	<b>Activity 1.3.1</b> Identify priority knowledge, skills and competencies that institutions responsible and accountable for monitoring of POPs should further adopt in order to be able to fully answer the objectives and goals set out in the specific objective 1.1	Mid 2015
	<b>Activity 1.3.2</b> Based on previously established priorities, define project objectives that will enable the adoption of the necessary knowledge, skills and competencies, and to define criteria based on which will be selected scientific research and/or higher education institutions which will be entrusted with the implementation of projects	End of 2015
	<b>Activity 1.3.3</b> Provide project funding for knowledge, skills and competences required for the evaluation of monitoring results and risk assessment of the effects of POPs on human health and the environment	End of 2018
	<b>Activity 1.3.4</b> Establish mechanisms of transfer of knowledge, skills and competences acquired through the implementation of approved projects, and implement these transfers in the institutions responsible for the implementation of POPs monitoring, and evaluation of research results	End of 2018
<b>Specific Objective 1.4</b> Designed, adopted and implemented monitoring programs of POPs in bodily fluids and biological material of human and animal origin, and in food and the working environment	<b>Activity 1.4.1</b> Identify POPs and types of biological materials to be monitored, and develop a monitoring plan	Mid 2015
	<b>Activity 1.4.2</b> Establish a mechanism for coordination between the institutions responsible for collecting, sorting and dissemination of data on monitoring results, release of POPs and the environment and the disposal of waste containing POPs, and to collect, sort, and make existing data available	2015
	<b>Activity 1.4.3</b> Establish a plan for monitoring all of POPs substances in food and working environment, in accordance with the EU regulations	2016
	<b>Activity 1.4.4</b> Implement monitoring programs in food and working environment that will include all POPs substances and ensure dissemination of the results, in accordance with EU regulations	2018 - 2019
<b>Main Objective 2: Monitoring of waste and sites potentially contaminated with POPs compounds (so-called hot-spots)</b>		
<b>Specific Objective 2.1</b> Detailed inventory and monitoring of areas potentially contaminated with POPs in BiH	<b>Activity 2.1.1</b> On the basis of information collected in previous research on probable contaminated locations with POPs, determine a preliminary list of these areas in BiH	
	<b>Activity 2.1.2</b> In the case of determining the concentration of POPs over permitted values on locations, draw up a plan of remediation and continuous monitoring, which will be used on the identified locations to monitor the effects of the measures	2018
	<b>Activity 2.1.3</b> Develop a monitoring program of unintentionally produced POPs from industry	2018



	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: MoFTER, MCA (coordination) FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Other competent ministries in BiH, FBiH, RS and BD and institutions nominated for conducting monitoring	Regular activities within the budget
	Institutions nominated for monitoring	Other competent ministries in BiH, FBiH, RS and BD	Regular activities within the budget FBiH: 14,400 BAM RS: 12,600 BAM BD: 3,000 BAM Funds required for training and workshops
	Institutions nominated for monitoring	Other competent ministries in BiH, FBiH, RS and BD	Regular activities within the budget FBiH: 7,200 BAM RS: 6,300 BAM BD: 1,500 BAM
	BiH: MoFTER, MCA FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Institutions nominated for monitoring	Regular activities within the budget FBiH: 21,600 BAM RS: 18,900 BAM BD: 4,500 BAM
	BiH: MoFTER, MCA FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Other competent ministries in BiH, FBiH, RS and BD and institutions nominated for monitoring	Regular activities within the budget
	BiH: MoFTER, MCA (coordination) FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Other competent ministries in BiH, FBiH, RS and BD and institutions nominated for monitoring	Regular activities within the budget
	BiH: MoFTER, MCA FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Other competent ministries in BiH, FBiH, RS and BD and institutions nominated for conducting monitoring, scientific research institutes and higher education organizations	FBiH: 1,008,000 BAM RS: 882,000 BAM BD: 210,000 BAM It is necessary to apply for funding from international financial mechanisms.
	BiH: MoFTER, MCA FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Other competent ministries in BiH, FBiH, RS and BD and institutions nominated for monitoring	FBiH: 86,400 BAM RS: 75,600 BAM BD: 18,000 BAM It is necessary to apply for funding from international financial mechanisms.
	BiH: MoFTER, MCA (coordination) FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Institutions nominated for monitoring	Regular activities within the budget FBiH: 2,880 BAM RS: 2,520 BAM BD: 600 BAM
	BiH: MoFTER FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Institutions nominated for monitoring	Regular activities within the budget
	BiH: MoFTER, MCA FBiH: FMH, FMET, FMAWMF, FMLSP RS: MHSP, MPPCEE, MAFWM, MLWVDP BD: DHOS, DAFWM, DSPPA	Institutions nominated for monitoring	Regular activities within the budget
	BiH: MoFTER, MCA (coordination) FBiH: FMH, FMET, FMAWMF, FMLSP RS: MHSP, MPPCEE, MAFWM, MLWVDP BD: DHOS, DAFWM, DSPPA	Institutions nominated for monitoring	FBiH: 1,440,000 BAM RS: 1,260,000 BAM BD: 300,000 BAM

*This activity is described in detail in Strategy and Action Plan: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner*

	BiH: MoFTER (coordination) FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Institutions nominated for monitoring	FBiH: 28,800 BAM RS: 25,200 BAM BD: 6,000 BAM
	BiH: MoFTER (coordination) FBiH: FMET RS: MPPCEE BD: DSPPA	Institutions nominated for monitoring	FBiH: 28,800 BAM RS: 25,200 BAM BD: 6,000 BAM

Action Plan 3.3.18: Research, development and monitoring (Article 11)		
Objectives	Activities	Time frame
	<b>Activity 2.1.4</b> On the basis of the results obtained (under Activity 2.1.2) assess the impact of contaminated site on human health, especially vulnerable groups, and on the environment in the vicinity of the site defined on the basis of practice of other signatories of the Stockholm Convention	2018 - 2019
<b>Specific Objective 2.2</b> Risk assessment conducted and conclusions made on public health impact of population's exposure to POPs	<b>Activity 2.2.1</b> Based on the risk assessment, determine the most vulnerable groups of the population and prepare action plan to reduce the impacts of POPs (primarily through food) on the targeted population, but also on the BiH population as a whole	2018
	<b>Activity 2.2.2</b> Nominate institutions and implement programs to reduce the impact and risk of exposure of target population to POPs substances	2019
	<b>Activity 2.2.3</b> Establish periodic monitoring program to track the effectiveness of the proposed activities and implement this monitoring	2019 - 2020
<b>Expected commencement of implementation of the action plan</b>		
<b>Duration of the implementation of the action plan</b>		
<b>Total estimated required financial resources</b>		

### 3.3.19 ACTION PLAN: TECHNICAL AND FINANCIAL ASSISTANCE (ARTICLES 12 AND 13)

Considering that BiH is a country with a transitional economy, receiving technical and financial assistance from developed countries is of key importance for the successful implementation of the Stockholm Convention. In regards to that, it is necessary for BiH to try to obtain as much foreign funding as possible, under favourable conditions. Most of the foreign funds are necessary for the creation of a detailed inventory, final disposal of POPs, monitoring, and technical assistance and the transfer of technology.

Foreign funding can be obtained not only in the form of favourable loans and donations, but also in the form of equipment and the transfer of knowledge.

International financial resources are required for BiH mostly for the following projects:

- Implementation of BAT/BEP measures in the production of iron and non-ferrous metals
- Implementation of BAT/BEP measures for the reduction of unintentionally produced POPs in the environment (filters, purification systems, combustion-free technologies etc.) from other sources
- Production of a detailed inventory of equipment which contains or is contaminated by PCB and PCB waste
- Implementation of the Plan for discontinuing the use/decontaminating equipment which contains or is contaminated by PCB
- Production of a Plan for taking care of/decontaminating equipment which contains PCB and PCB waste in BiH
- Identification of necessary capacities, and establishing a temporary storage space for PCB waste, as part of a storage space for hazardous waste
- Production of a detailed inventory of PBDEs which includes the entire life cycle of these substances in BiH;
- Introduction of a system for the quick detection of the presence of PBDEs in used imported EEO, furniture and vehicles (e.g. „sliding spark spectroscopy“ technology);
- Establishment of a system operator for managing electrical and electronic waste in RS and BD, which will coordinate its activities with the system operator in FBiH;

	Competent institution/organization	Stakeholders	Estimated financial resources
	BiH: MoFTER, MCA (coordination) FBiH: FMH, FMET RS: MHSP, MPPCEE BD: DHOS, DSPPA	Institutions nominated for monitoring	FBiH: 14,400 BAM RS: 12,600 BAM BD: 3,000 BAM
	BiH: MoFTER (coordination) FBiH: FMH, FMET RS: MHSP, MPPCEE BD: DHOS, DSPPA	Entity and cantonal public health institutes, as well as the competent department of the BD Government	FBiH: 18,500 BAM RS: 15,750 BAM BD: 3,750 BAM
	BiH: MoFTER, MCA FBiH: FMH, FMET RS: MHSP, MPPCEE BD: DHOS, DSPPA	Other competent ministries in BiH, FBiH, RS and BD and entity and cantonal public health institutes, as well as the competent department of the BD Government	FBiH: 576,000 BAM RS: 504,000 BAM BD: 120,000 BAM It is necessary to apply for funding from international financial mechanisms.
	BiH: MoFTER, MCA (coordination) FBiH: FMH, FMET, FMAWMF RS: MHSP, MPPCEE, MAFWM BD: DHOS, DAFWM, DSPPA	Other competent ministries in BiH, FBiH, RS and BD and institutions nominated for monitoring	Regular activities within the budget FBiH: 36,000 BAM RS: 31,500 BAM BD: 7,500 BAM
<b>Upon the adoption of the NIP</b>			
<b>2015 - 2020</b>			
<b>8,639,000 BAM</b> <b>(FBiH: 4,146,980 BAM, RS: 3,628,170 BAM, BD: 863,850 BAM)</b>			

- Establishment of authorised centres for the disposal of ELV;
- Procurement of adequate equipment for the quick detection of the presence of PBDEs in OEEO, ELV and furniture;
- Preparation of a strategy for phasing-out PFOS from the industries where it is used (electroplating, photolithography) along with the application of BAT/BEP;
- Production of plans for the gradual switch to alternatives to PFOS along with the application of BAT/BEP;
- Preliminary and detailed research of locations contaminated by POPs;
- Production of technical guidelines for the remediation of contaminated areas;
- Prioritisation of areas contaminated by POPs and a preparation of a list of priorities for remediation;
- Remediation of priority locations contaminated by POPs;
- Ensuring that requirements are met in terms of the necessary equipment, space and staff in institutions which are nominated for the implementation of monitoring;
- Projects for ensuring the knowledge, skills and competencies necessary for the evaluation of the results of monitoring and the risk assessment of the impact of POPs on the people's health and the environment;
- Transfer of knowledge, skills and competencies to institutions responsible for the implementation of the monitoring of POPs;
- Implementation of a program for reducing the impact of and risk of exposure to POPs substances for targeted parts of the population;
- Organisation of various training programs for the Indirect Taxation Authority of BiH (Customs department), inspection bodies of FBiH, RS and BD, technologists in the industry, technicians and repairmen, etc.

The action plans also list the other activities for which it is necessary to apply for funding from international financial mechanisms.

It is anticipated that BiH will seek the available funds from developed countries pursuant to the agreement of the Conference of the Parties to the Convention.

## 3.4 IMPLEMENTATION TIMELINE WITH RESOURCE NEEDS ASSESSMENT

Table 186:  
Implementation timeline  
with resource needs  
assessment<sup>192</sup>

Year Activities	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>ACTION PLAN 3.3.1: INSTITUTIONAL AND REGULATORY STRENGTHENING MEASURES</b>												
<b>Main Objective 1. Improving or creating an adequate legal framework relating to all aspects of managing POPs chemicals which are listed under the Stockholm Convention and aspects of environmental protection (including hazardous wastes)</b>												
<b>Specific Objective 1.1. Legislation that ensures the fulfilment of all obligations under the Stockholm Convention, drafted/amended/revise and adopted at BiH, FBiH, RS and BD levels</b>												
<b>Activity 1.1.1</b> Pass a <i>lex specialis</i> Law on POPs at FBiH, BD and RS level to regulate in detail the entire lifecycle of all chemicals mentioned in the Stockholm Convention	30											30
<b>Activity 1.1.2</b> Insert/update/amend provisions on POPs in the relevant legal regulations in FBiH, RS and BD (Law on Environment, Law on Waste Management, Law on Air Protection,...)	0											0
<b>Activity 1.1.3</b> Adopt law on chemicals and biocides in FBiH and BD: revise the draft of the FBiH Law on Chemicals to harmonize it with the provisions of the Stockholm Convention and accelerate its passing, and prepare and adopt the Law on Chemicals in BD	15											15
<b>Activity 1.1.4</b> Pass relevant bylaws in accordance with Regulation (EC) 1907/2006 ("REACH")		40										40
<b>Activity 1.1.5</b> Pass a Regulation on Terms to Limit and Ban Production, Circulation and Use of Chemicals, to include chemicals listed in the Stockholm Convention, and align it with Commission's Regulation (EC) No. 757/2010 on POPs, amending Regulation No. 850/2004		10										10
<b>Activity 1.1.6</b> Adopt all EU standards and recommended procedures to measure POPs in environment and food	0											0
<b>Specific Objective 1.2. Laws and bylaws related to the monitoring of chemicals that are listed under the Stockholm Convention are harmonized with EU Regulations, which necessitates amending the bylaws regulating the emission limit values and levels of impact</b>												
<b>Activity 1.2.1</b> Adopt the missing and update the existing legal documents in FBiH, RS and BD related to POPs, in accordance with the Stockholm Convention and EU regulations	See Action Plan 3.3.9: Measures to reduced emissions from unintentional production and 3.3.18: Research, development and monitoring											
<b>Activity 1.2.2</b> Appoint specific institutions for the implementation of the Stockholm Convention, laboratories for sampling and analysis and inspection bodies through relevant laws at FBiH, RS and BD level	30											30
<b>Main Objective 2. Establishing a mechanism for the coordination and enhancing the institutional framework for the implementation of the Stockholm Convention as well as allocating responsibilities for all aspects of POPs management in the existing institutional framework</b>												
<b>Specific Objective 2.1. Established coordination mechanism for carrying out obligations of BiH undertaken by ratifying the Stockholm Convention and reporting to the Convention Secretariat</b>												
<b>Activity 2.1.1</b> Establish an effective and reliable coordination mechanism between MOFTER and institutions responsible for Stockholm Convention in the entities and BD (FMET, MPPCEE and DSPPA) with clearly defined obligations and responsibilities for the implementation of the Convention	31											31
<b>Activity 2.1.2</b> Appoint persons/units responsible for the implementation of the Stockholm Convention in the institutions	0											0
<b>Specific Objective 2.2. Established comprehensive systems/mechanisms for managing chemicals in BiH, FBiH, RS and BD</b>												
<b>Activity 2.2.1</b> Appoint relevant bodies to monitor the implementation of the Stockholm Convention (including emissions and imissions of unintentionally produced POPs) within the appropriate ministries at entity and BD level	0											0
<b>Activity 2.2.2</b> Nominate institution/s responsible for collection, sorting and further distribution of data on monitoring results, release of POPs into the environment and disposal of waste containing POPs, and collect, sort and make available the existing data	See Activities 1.4.2 under Action Plan 3.3.18: Research, development and monitoring											

192 Note: The amount of resources in the table related to regular activities within the budget, unless noted otherwise.

## Strategy and Action Plan Elements of the National Implementation Plan

Year Activities	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>Activity 2.2.3</b> Nominate institutions responsible for monitoring of biomes in entities and BD	<i>See Activities 1.1.2 under Action Plan 3.3.18: Research, development and monitoring</i>											
<b>Specific Objective 2.3. Strengthening capacities for amendment and an effective implementation of the adopted legislation through training and educating relevant staff</b>												
<b>Activity 2.3.1</b> Appoint bodies at BiH, entity and BD level responsible for continued development, specialization and sub-specialization through university faculties and institutions appointed to control POPs		0										0
<b>Activity 2.3.2</b> Prepare and implement a detailed plan of training and education about the impact of POPs chemicals (including inspection and customs staff) in bodies responsible for management of POPs chemicals and waste containing POPs	<i>See individual Action Plans for specific segments of POPs management</i>											
<b>Specific Objective 2.4. Additionally trained and enhanced inspectional supervision</b>												
<b>Activity 2.4.1</b> Organize training programs for inspection bodies in accordance with the detailed plan for training and education	<i>See individual Action Plans for specific segments of POPs management</i>											
<b>Main Objective 3. Introducing economic measures for environmental protection and the implementation of the Stockholm Convention</b>												
<b>Specific Objective 3.1. Introduced environmental fees</b>												
<b>Activity 3.1.1</b> In BD, establish an Environmental Protection Fund, in accordance with the Strategy of Environmental Protection of BD for the period 2013 - 2023 (draft at a public hearing)	200											200 <sup>193</sup>
<b>Activity 3.1.2</b> In RS and BD (after the implementation of Activity 3.1.1. and after the adoption of regulations governing management of waste from electrical and electronic equipment (EEE) in accordance with Activity 1.1.3. Action Plan 3.3.5.) introduce a fee for the waste management of electronic and electrical products modelled after the system in FBiH			0									0
<b>Activity 3.1.3</b> Introduce a fee for ELV management			0									0
<b>Activity 3.1.4</b> Introduce compensation for accidental releases of POPs into the environment (Annex C), which would be paid by industries identified as a potential source in the preliminary inventory			0									0
<b>Specific Objective 3.2. Introduced penalties for non-compliance with regulations on the emissions of pollutants</b>												
<b>Activity 3.2.1</b> Prescribe fines for non-compliance with regulations on the emissions of pollutants		0										0
<b>Main Objective 4. Establishing criteria and mechanisms for the customs control of import, export and transit of equipment and products that potentially contain POPs</b>												
<b>Specific Objective 4.1. Strengthened mechanism for controlling import of equipment and products that potentially POPs</b>												
<b>Activity 4.1.1</b> Amendment to the Customs Tariff relating to: ▪ POPs pesticides ▪ Equipment with PCBs (transformers and capacitors containing PCBs) ▪ Electrical and electronic equipment produced before 01.07.2006. ▪ Firefighting AFFF foam, hydraulic oils for civil aviation	10											10
<b>Activity 4.1.2</b> Organize training program of the Indirect Taxation Authority (Customs Sector) for: ▪ control of illegal import of POPs pesticides ▪ control of illegal imports of products and equipment containing PCBs ▪ control of import / export of used cars and furniture and EEO (related to Activity 2.2.3 of the Action Plan 3.3.5) ▪ control of illegal import / export of equipment that may contain PBDEs ▪ control of illegal import / export of PFOS		16	16	16	16	16						80
<b>Activity 4.1.3</b> Enhance control at border crossings to prevent illegal import of POPs		0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL ACTION PLAN 3.3.1</b>	116	66	16	16	16	16	0	0	0	0	0	246

193 The amount taken from the draft Environmental Strategy of the BD for the period 2013 - 2023 - is not included in this Action Plan





Year Activities	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>Activity 3.1.2</b> Organize training of technicians and service personnel for the proper maintenance of equipment containing PCBs		30	35									65
<b>Activity 3.1.3</b> Establish databases of owners of equipment containing or contaminated by PCBs and PCB waste		15	15									30
<b>Activity 3.1.4</b> Develop procedures for verification of the data obtained from the owner of the equipment and waste containing PCBs		6										6
<b>Activity 3.1.5</b> Perform a detailed inventory of equipment containing or contaminated with PCBs and PCB waste		100	100	110								310
<b>Activity 3.1.6</b> Regularly update databases of owners of equipment containing PCBs and PCB waste				8.5	8.5	8.5	8.5	8.5	8.5	8.5	0	59.5
<b>Activity 3.1.7</b> Develop guidelines for identification of PCBs in open applications				30								30
<b>Activity 3.1.8</b> Develop a report on equipment and waste containing PCB (for reporting in accordance with the requirements of the Convention)					10							10
<b>Specific Objective 3.2. Phase-out management plan for equipment containing or contaminated by PCBs is developed and fully implemented</b>												
<b>Activity 3.2.1</b> Develop a phase-out management plan to exclude from use / decontaminate equipment containing or contaminated with PCBs		0	0									Requirement of the equipment's owner
<b>Activity 3.2.2</b> Implement the phase-out management plan to exclude from use / decontaminate equipment containing or contaminated with PCBs			-	-	-	-	-	-	-	-	-	194
<b>Main Objective 4. Ensuring an adequate hazardous waste management system (with a focus on waste containing PCBs) in accordance with the provisions of the Basel Convention</b>												
<b>Specific Objective 4.1. Established, harmonized and operational management systems for special categories of waste, including waste containing PCBs</b>												
<b>Activity 4.1.1</b> Establish information systems - database of PCB waste	<i>This Activity is implemented within Activity 3.1.3 of this Action Plan.</i>											
<b>Activity 4.1.2</b> Develop a plan of disposal / decontamination of equipment containing PCBs and PCB waste in BiH				100								100
<b>Activity 4.1.3</b> Identify the necessary capacities and establish temporary storage facilities for PCB waste, as part of hazardous waste storage			-	-	-	-						195
<b>Activity 4.1.4</b> Safely dispose of equipment containing PCBs			-	-	-	-	-	-	-	-	-	196
<b>TOTAL ACTION PLAN 3.3.4</b>	66	186	175	248.5	18.5	8.5	8.5	8.5	8.5	8.5	0	736.5
<b>ACTION PLAN 3.3.5: PRODUCTION, IMPORT AND EXPORT, USE, STOCKPILES AND WASTES HEXABDE AND HEPTABDE (ANNEX A, PART IV) I TETRABDE I PENTABDE (ANNEX A, PART V) AND HBB, WHERE APPLICABLE (ANNEX A, PART I)</b>												
<b>Main Objective 1: Improving the legal framework for the management of PBDEs</b>												
<b>Specific Objective 1.1. Legislation ensuring the fulfillment of all commitments related to PBDEs from the Stockholm Convention is prepared/ changed/updated and adopted at BiH, FBiH, RS and BD</b>												
<b>Activity 1.1.1.</b> Develop and adopt a bylaw (regulation) governing the placing on the market of products containing commercial PentaBDE (c-PentaBDE) in accordance with Directive 2003/11 / EC		15										15
<b>Activity 1.1.2</b> Develop and adopt a bylaw (Rulebook) governing the placing on the market of products containing commercial c-OctaBDE in accordance with Directive 2003/11 / EC		15										15
<b>Activity 1.1.3</b> In RS and BD develop and adopt rules on the management of waste from electrical and electronic products harmonized with the same in the Federation and with the Directive 2002/96/EC, and compliant with the new Directive 2012/19/EC, which entered into force on 14 February 2014		10										10

194 At this stage, it is not possible to determine the costs of Plan's implementation. Given that equipment owners will not be able to bear the costs of replacing and disposing the equipment, it will be necessary to secure funds for that purpose (international donations, projects)

195 Funding to be secured (estimate cca 100.000 KM/ storage) – not included in the Action Plan

196 The necessary funding will be set after completion of Activity 3.1.5 and Activity 4.1.2



Year Activities	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>Activity 1.1.4</b> In FBIH harmonize the <i>Regulation on Management of Waste from Electrical and Electronic Products</i> with the new Directive 2012/19/EC, which entered into force on 14 February 2014		2										2
<b>Activity 1.1.5</b> In Entities and BD, prepare and adopt regulations governing the obligation to register end-of life vehicles (ELVs) in accordance with Directive 2000/53/EC on ELVs, and incorporate in the <i>Regulation on Vehicle Registration</i> (Official Gazette of BiH, No. 69 / 09) an obligation to have ELV vehicles registered in IDDEEA database		15										15
<b>Activity 1.1.6</b> In legislation dealing with waste management, insert obligation to incorporate BAT/ BEP approaches to recycling and managing end-of lifecycle products, which are a significant source of POPs PBDEs (furniture, insulation foam, vehicles and EEE)		0	0									0
<b>Activity 1.1.7</b> Align or prepare and adopt legislation harmonized with the Directive 2011/65 / EC ("RoHS 2 Directive") on the restriction of hazardous substances in EEE. The development of this legislation is underway in RS	11											11
<b>Activity 1.1.8</b> In the Entities, adopt legislation governing the management of waste from ELVs in accordance with Directive 2000/53 / EC		15										15
<b>Main Objective 2: Strengthening technical capacity for collecting, organizing, structuring and processing data on PBDEs in BiH, including the establishment and coordination of information systems in FBIH, RS and BD, and improve the exchange of information between the competent institutions</b>												
<b>Specific Objective 2.1. Established and made operational information systems for management of chemicals, including PBDEs, in FBIH, RS and BD</b>												
<b>Activity 2.1.1</b> Create new or update existing database that will contain information on PBDEs			8	8	8	8	8	8	0			48
<b>Activity 2.1.2</b> Establish a data register, which will contain information about imported, registered and end-of life vehicles per country of origin and year of production - introduce origin as an additional element in the existing database and link it with a database on POPs			5	5	5	5	5	5	0			30
<b>Activity 2.1.3</b> Improve existing databases used by ITA to record imports of used EEE goods by year of production and origin - introduce year of production as an additional element in the existing database of customs tariffs and link it with a database of POPs chemicals		0	0									0
<b>Activity 2.1.4</b> Introduce a voluntary system of composition declaration for EEE (such as Joint Industry Guide), which would contribute to compliance with the legislation on EEE management. In accordance with this system, suppliers are obliged to report the presence of problematic materials and substances				11								11
<b>Activity 2.1.5</b> Develop a detailed inventory of PBDEs, which covers the entire lifecycle of these substances in BiH, based on the guidelines of UNIDO and during the next review of the NIP					110							110
<b>Specific Objective 2.2. Established and made operational information systems for hazardous waste management in FBIH, RS and BD, including PBDEs</b>												
<b>Activity 2.2.1</b> In accordance with the existing legal and institutional set up (at entity level), create a database on waste EEE according to year of manufacture and origin, at the level of system operators and link it with databases of POPs and registers of plants and pollution			5	5	5	5	5	5	0			30
<b>Activity 2.2.2</b> Link a database of ELV, led by IDDEEA, with existing databases that will contain information on POPs and databases that are kept as part of the implementation of the Basel and Rotterdam Convention in BiH			0									0
<b>Activity 2.2.3</b> Introduce and implement systems for speedy detection of the presence of PBDEs in second hand imported EEE, furniture and vehicles (e.g. "sliding spark spectroscopy" technology)			30	30	15							75
<b>Main Objective 3: Ensuring an adequate hazardous waste management system (with a focus on waste containing PBDEs)</b>												
<b>Specific Objective 3.1. Established, harmonized and made operational systems of management of special waste categories that relate to waste containing EEE and waste vehicles</b>												

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>Activity 3.1.1</b> Ensure implementation of provisions of the legislation (laws on waste management in the FBiH, RS and BD) which prohibits disposal of hazardous waste with municipal waste at municipal landfills		0										0
<b>Activity 3.1.2</b> Develop waste management plans containing PBDEs (WEEE, ELV, furniture) at the level of entities and cantons (in FBiH) while respecting the principles of the existing environmental protection and waste management strategies		60										60
<b>Activity 3.1.3</b> Safe final disposal of equipment containing PBDEs in accordance with legal provisions in force			-	-	-	-	-	-	-			-197
<b>Specific Objective 3.2. Strengthened control mechanism of management of special categories of waste, especially in areas where system operators have the leading role (e.g. waste from EEE)</b>												
<b>Activity 3.2.1</b> In RS and BD establish a system operator for managing electrical and electronic waste that will coordinate its activities with the operator of the system in FBiH, and exchange data to ensure effective management of the systems			1,500									1,500 <sup>198</sup>
<b>Activity 3.2.2</b> Implement a pilot project in selected car scrap yards in order to verify the introduction of the concept mentioned in Activity 3.2.3 at the state level, or to examine the appropriate model for BiH			-	-								-199
<b>Activity 3.2.3</b> Establish authorized centers for the disposal of ELVs in accordance with the "Guidelines for the Best Available Techniques and best practices for environmental recycling and disposal of products containing polybrominated diphenyl ethers (PBDEs)," and maintain databases on the amounts of separated polymers containing PBDEs in accordance with Regulations on Waste Categories with Lists in FBiH, RS and BD					-	-	-	-	-			-200
<b>Activity 3.2.4</b> Procure adequate equipment for the rapid detection of the presence of PBDEs in WEEE, ELV and furniture			-									-201
<b>Main Objective4: Improving institutional framework for management of PBDEs</b>												
<b>Specific Objective 4.1. Strengthened capacities for change and effective implementation of the adopted legislation through training and education of relevant staff</b>												
<b>Activity 4.1.1</b> Educate staff to use equipment under Activity 2.2.3			30									30
<b>Activity 4.1.2</b> Prepare the report on equipment and waste containing PCBs				10								10
<b>Specific Objective 4.2. Advanced and strengthened inspection</b>												
<b>Activity 4.2.1</b> Educate staff of inspection bodies in FBiH, RS and BD on equipment on market that may contain PBDEs (WEEE, ELV, furniture, polyurethane foam, etc.)			70									70
<b>Activity 4.2.2</b> Increase inspection in terms of registering equipment containing PBDEs to market inspection and other relevant institutions		0	0									0
<b>TOTAL ACTION PLAN 3.3.5</b>	11	132	148	69	143	18	18	18	0			557
<b>ACTION PLAN 3.3.6: Production, import and export, use, stockpiles and wastes of DDT (Annex B)</b>												
<i>This Action Plan is not elaborated separately, as it is contained in the Action Plan 3.3.3: Production, import and export, use, stockpiles and wastes of POPs pesticides (Annex A, Part I)</i>												
<b>ACTION PLAN 3.3.7: PRODUCTION, IMPORT AND EXPORT, USE, STOCKPILES AND WASTES OF PFOS, ITS SALTS AND PFOSF (APPENDIX B, PART III)</b>												
<b>Main Objective 1: Improving or creating an adequate legal framework for all aspects of PFOS management</b>												
<b>Specific Objective 1.1. Legislation, ensuring the fulfillment of all obligations under the Stockholm Convention relating to PFOS, is drafted/changed/ updated and adopted at the level of BiH, FBiH, RS and BD</b>												
<b>Activity 1.1.1</b> Develop and adopt appropriate by-laws regulating the measures for safe and healthy work when exposed to chemical substances, carcinogens or mutagen		5	10									15

197 The necessary funding will be determined once Activity 3.1.2 is completed.

198 This estimate is made based on Article 13 of the Regulation on managing waste from electric and electronic products in FBiH, which has not been included in the final amount necessary to implement this action plan

199 At this stage, costs of this Activity cannot be estimated. Funding will have to be secured from international sources and projects.

200 At this stage, costs of this Activity cannot be estimated. Funding may be secured from international funds/sources.

201 At this stage, costs of this Activity cannot be estimated. Funding for equipment may be secured from international sources.

Year Activities	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>Main Objective 2: Strengthening technical capacity for collecting, organizing, structuring and processing data on POPs in BiH</b>												
Specific Objective 2.1. Established and made operational information systems for management of PFOS chemicals in FBIH, RS and BD, in accordance with best practice experiences of EU countries												
Activity 2.1.1 Develop new or update existing databases on chemicals with information on PFOS	<i>This Activity is implemented jointly with Activity 2.1.1. of Action Plan 3.3.5</i>											
Activity 2.1.3 Develop a detailed inventory of PFOS substances in BiH, including fire-fighting foam				60	50							110
<b>Main Objective 3: Ensuring an adequate hazardous waste management system (with a focus on waste containing PFOS)</b>												
Specific Objective 3.1. Adopted/harmonized regulations in FBIH, RS and BD, defining special categories of waste management, including waste containing PFOS												
Activity 3.1.1 In RS and BD, develop and adopt regulations on management of waste from electrical and electronic products harmonized with the new Directive 2012/19 / EU ("WEEE Directive"), which entered into force on 14 February 2014	<i>See Activity 1.1.3. of Action Plan 3.3.5</i>											
Specific Objective 3.2. Established, harmonized and made operational management systems for special categories of waste, including waste containing PFOS												
Activity 3.2.1 Develop waste management plan for waste containing PFOS, including fire-fighting foam		60										60
Activity 3.2.2 Safely dispose of equipment containing PFOS in accordance with the legal provisions in force			-	-	-	-	-	-	-			-202
<b>Main Objective 4: Improving the institutional framework for all aspects of PFOS</b>												
Specific Objective 4.1. Strengthened capacities for change and effective implementation of the adopted legislation through training and education of relevant staff												
Activity 4.1.1 Educate employees of ITA - Customs Sector	<i>This Activity is implemented jointly with Activity 4.1.1. from Action Plan 3.3.5</i>											
Activity 4.1.2 Educate employees of the entity and BD inspection authorities, in particular market markets, labor and environmental inspectors	<i>This Activity is implemented jointly with Activity 4.2.1 from Action Plan 3.3.5</i>											
Specific Objective 4.2. Established comprehensive systems / management mechanisms of PFOS in BiH, FBIH, RS and BD												
Activity 4.2.1 Develop strategies for phasing-out of PFOS from use in the industries in which it is used (platinum coating, photolithography) with implementation of BAT/BEP				60								60
Activity 4.2.2 Develop a plan for gradual transition to alternatives to PFOS, with implementation of BAT / BEP					-							-203
Activity 4.2.3 Draft report on products and waste containing PFOS				10								10
<b>Main Objective 5: Education and raising awareness of the public and target groups</b>												
Specific Objective 5.1. Undertake activities to educate and raise awareness among target groups (decision-makers, the public, industry) on obligations under the Convention on the issue of PFOS												
Activity 5.1.1 Educate technologists in the industry on best practices to phase out the use of PFOS		-										-204
Activity 5.1.2 Educate primary users of products (fire-fighting foam) which may contain PFOS - fire brigades, emergency teams in large industrial plants, airports, etc.		45										45
Activity 5.1.3 Educate importers and distributors of consumer products that may contain PFOS		20										20
TOTAL ACTION PLAN 3.3.7	5	135	0	130	50	0	0	0	0	0	0	320
<b>ACTION PLAN 3.3.8: REGISTER OF EXEMPTIONS AND CONTINUING NEED FOR EXEMPTIONS (Article 4)</b>												
Elaborated only in the textual part of the document.												
<b>ACTION PLAN 3.3.9: MEASURES TO REDUCE EMISSIONS FROM UNINTENTIONAL PRODUCTION (Article 5)</b>												
<b>Main Objective 1: Improving the legal and institutional framework for the management of unintentionally produced POPs</b>												
Specific Objective 1.1. Legislation to ensure the fulfilment of obligations under the Stockholm Convention relating to the management of unintentionally produced POPs drafted / amended / updated and adopted at the level of BiH, FBIH, RS and BD												

202 It is not possible to determine the cost for this Activity pending the implementation of Activity 2.1.3. (responsibility of equipment owner)

203 At this stage it is not possible to determine the costs of carrying out these activities. Funds may be provided from the budget or from international sources / funds.

204 The costs of education will need to be borne by the industry. The funds can be secured from international sources / funds.

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>Activity 1.1.1</b> Through legal and subordinate legislation, define the limits of unintentionally produced POPs into the environment, ways of monitoring emissions and monitoring, meeting the requirements specified in BAT (primarily in heavy and non-ferrous metallurgy and energy production)	10	11										21
<b>Specific Objective 1.2. Strengthened capacity of institutions in FBiH, RS and BD and enhanced inspection</b>												
<b>Activity 1.2.1</b> Strengthen the capacity of employees of ministries and inspections related to the implementation of BAT/BEP in the process of obtaining environmental permits and further control of BAT/BEP implementation to reduce unintentional production of POPs, to ensure comprehensive and long-term emissions monitoring	18	18	18	18	18	0						90
<b>Activity 1.2.2</b> Increase inspection of the implementation of the provisions contained in environmental permits	0	0	0	0	0	0	0	0	0	0	0	0
<b>Main Objective2: Reducing unintentional releases of POPs (Annex C) from industry and other sources (heat and power generation, disposal of municipal, medical and other types of hazardous waste, etc.) and the strengthening of inspection and other control capacities</b>												
<b>Specific Objective 2.1. Informing industries and institutions that can potentially create PCDD/PCDF during their processes to take steps to prevent emissions of these chemicals in the environment by applying the optimization of processes, treatment of air emissions and/or a change of raw materials or processes, and strengthening the capacity of their employees to apply BAT / BEP</b>												
<b>Activity 2.1.1</b> Develop a mechanism to inform industry about the optimization of production processes		15	15									30
<b>Activity 2.1.2</b> Promote the introduction of BAT and BEP in industry, energy sector, waste management sector, medical and other institutions, and make BAT and BEP applied in the EU available and user-friendly via the web and other media		4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5	4.5		40.5
<b>Specific Objective 2.2. Reduced unintentional discharges of POPs listed in Annex C of the Convention for the main sources identified through the application of BAT and BEP</b>												
<b>Activity 2.2.1</b> Implement BAT/BEP measures in the production of iron and non-ferrous metals												25,000 – 35,000 <sup>205</sup>
<b>Activity 2.2.2</b> Apply means to reduce unintentionally produced POPs into the environment (filters, purification systems, non-incineration technology, etc.) from other sources, in accordance with the recommendations of BAT and BEP		-	-	-	-	-	-	-	-	-	-	~206
<b>Specific Objective 2.3. Ensured regular monitoring and evaluation of sources and emissions of unintentionally produced POPs</b>												
<b>Activity 2.3.1</b> Appoint and additionally educate (if necessary) responsible laboratories that can perform qualitative and quantitative analysis, and monitor unintentionally produced POPs according to legal provisions	See Action Plan 3.3.18. Research, monitoring and development											
<b>Activity 2.3.2</b> Regularly monitor POPs compounds from Annex C of the Convention in industrial entities and other institutions in the sectors of energy, waste disposal and health care that unintentionally produce them, include them into the database, and keep statistical records about changes in the concentration of measured parameters		12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5	12.5		112.5
<b>Activity 2.3.3</b> Continuously analyze the effectiveness of implemented BAT and BEP		3	3	3	3	3	3	3	3	3	3	30
<b>Main Objective 3: Strengthening technical capacity for collecting, organizing, structuring and processing data on unintentionally produced POPs</b>												
<b>Specific Objective 3.1. Established database on unintentional producers of POPs</b>												
<b>Activity 3.1.1</b> Make a list of all sources of unintentionally produced POPs	30	30										60
<b>Activity 3.1.2</b> Ensure timely annual submission to register of plants and pollution of data by businesses and other institutions on emissions of unintentionally produced POPs in all segments of the environment	0	0	0	0	0	0	0	0	0	0	0	0
<b>Specific Objective 3.2. Ranked polluters</b>												
<b>Activity 3.2.1</b> Based on the list of all sources of unintentionally produced POPs, rank polluters to enable taking the necessary steps		0	0	0	0	0						0

<sup>205</sup> Potrebno je osigurati sredstva kroz kroz donacije i projekte financirane od strane međunarodnih fondova

<sup>206</sup> Iznos sredstava moći će se utvrditi kada se pojedinačno utvrde svi privredni subjekti i ustanove koji trebaju primijeniti BAT i BEP. Financiranje od strane samih vlasnika ili kroz donacije i projekte financirane od strane međunarodnih fondova.

Year Activities	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>Activity 3.2.2</b> Record hot spots contaminated with unintentionally produced POPs	See Strategy and Action Plan 3.3.13: Identification of contaminated sites (Annex A, B and C) and remediation in an environmentally sound manner											
<b>Specific Objective 3.3. Updated inventory of unintentionally produced POPs</b>												
<b>Activity 3.3.1</b> Train the employees of ministries and other relevant institutions related to update of inventory of unintentionally produced POPs and its harmonization with register of plants and pollution		50										50
<b>Activity 3.2.2</b> Periodically update the inventory of unintentionally produced POPs - estimate the volume of emissions in all segments of the environment		4	4	4	4	4	4	4	4	4	4	40
<b>Activity 3.3.3</b> Develop reports on the release of unintentionally produced POPs (further elaborated under Action Plan 3.3.17: Reporting)					10							10
<b>Main Objective 4: Raising awareness of the public and target groups, and facilitating access to information on unintentionally produced POPs</b>												
<b>Specific Objective 4.1. Relevant information related to unintentionally produced POPs is publicly available</b>												
<b>Activity 4.1.1</b> Raise public awareness at all levels of education and all the institutions of civil society through workshops, booklets, leaflets, electronic information in the form of web sites and portals for general population		7.5	7	7	7	7	7	7	7	7	7	70.5
<b>TOTAL ACTION PLAN 3.3.9</b>	58	155.5	64	49	59	31	31	31	31	31	14	554.5
+ 25,000 – 35,000 for implementation of Activity 2.2.1												
<b>ACTION PLAN 3.3.10: Measures to reduce releases from stockpiles and wastes (Article 6)</b>												
ACTION PLAN 3.3.10 is contained within the following action plans: ACTION PLAN 3.3.3, ACTION PLAN 3.3.4, ACTION PLAN 3.3.5 and ACTION PLAN 3.3.7												
<b>STRATEGY 3.3.11: IDENTIFICATION OF STOCKPILES, ARTICLES IN USE AND WASTES</b>												
Strategy 3.3.11 is contained within the following action plans: ACTION PLAN 3.3.3, ACTION PLAN 3.3.4, ACTION PLAN 3.3.5 and ACTION PLAN 3.3.7												
<b>ACTION PLAN 3.3.12: TREATMENT OF STOCKS AND APPROPRIATE PRECAUTIONS FOR HANDLING AND STORING OBJECTS IN USE</b>												
ACTION PLAN 3.3.12 is contained within the following action plans: ACTION PLAN 3.3.3, ACTION PLAN 3.3.4, ACTION PLAN 3.3.5 and ACTION PLAN 3.3.7												
<b>STRATEGY WITH ACTION PLAN 3.3.13: IDENTIFICATION OF CONTAMINATED SITES (ANNEX A, B, AND C) AND REMEDIATION IN AN ENVIRONMENTALLY SOUND MANNER</b>												
<b>Main Objective 1. Enhancing or creating an adequate legal and institutional framework related to contaminated sites “hot-spots”</b>												
<b>Specific Objective 1.1. Adopted/harmonized regulations in FBiH, RS and BD and strengthened capacity to manage contaminated sites</b>												
<b>Activity 1.1.1</b> Analyze the basic questions that precede the development of the legal framework for management of contaminated areas		10	10	10								30
<b>Activity 1.1.2</b> Create new or update existing legislation on environmental protection and waste management that defines the management of contaminated sites				0								0
<b>Activity 1.1.3</b> Carry out employee training in institutions responsible for managing contaminated sites		20	20									40
<b>Main Objective 2. Ensuring an adequate management system of contaminated areas (“hot spots”)</b>												
<b>Specific Objective 2.1. Established system of management and remediation of contaminated sites</b>												
<b>Activity 2.1.1</b> Carry out a preliminary survey of potential sites contaminated with POPs		75	75									150
<b>Activity 2.1.2</b> Establish temporary registers of contaminated areas			50									50
<b>Activity 2.1.3</b> Establish official registers of contaminated areas				5	10	5						20
<b>Activity 2.1.4</b> Define technical guidelines for remediation of contaminated sites			50	50								100
<b>Activity 2.1.5</b> Carry out detailed survey of sites contaminated with POPs				45	120	85						250
<b>Activity 2.1.6</b> Prioritize areas contaminated with POPs and develop the list of priorities for remediation					50	50						100
<b>Activity 2.1.7</b> Develop plans for remediation and remediation of sites contaminated with POPs			24	24	24	24	24					120
<b>Specific Objective 2.2. Remediation of priority areas and ensured monitoring of remediation effects</b>												

Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>Activity 2.2.1</b> Remediate priority sites contaminated with POPs			-	-	-	-	-	-				207
<b>Activity 2.2.2</b> Monitor the effects of remediation				12	13	12	13	12	13	12	13	100
<b>TOTAL STRATEGY WITH ACTION PLAN 3.3.13</b>		105	229	146	217	176	37	12	13	12	13	960
<b>ACTION PLAN 3.3.14: FACILITATING OR UNDERTAKING INFORMATION EXCHANGE AND STAKEHOLDER INVOLVEMENT</b>												
<b>Main Objective 1. The establishment of an effective system of information exchange between relevant institutions in the FBiH, RS and BD and the National Focal Point</b>												
<b>Specific Objective 1.1. Strengthened mechanism of exchange of information between competent authorities horizontally (between entities and BD) and vertically (between entities, BD and state)</b>												
<b>Activity 1.1.1</b> Ensure mechanism of exchange of information about POPs with National Focal Point	15											15
<b>Activity 1.1.2</b> Oblige institutions to collect, exchange information and send them to the database at the entity, BD and BiH level. This includes the development of the <i>Procedure for reporting on POPs to the National Focal Point</i>	15											15
<b>Activity 1.1.3</b> Develop a procedure for exchange of information between the entity ministries and BD Government		15										15
<b>Activity 1.1.4</b> Improve the system for exchange of information between civil society, government and institutions that are designated as competent and responsible for the implementation of the Stockholm Convention, monitoring of unintentionally produced POPs, and assessment of their impact on health and the environment		0										0
<b>Activity 1.1.5</b> Collect, update and process data sent by the competent authorities at entity and BD levels, and deliver them to the Convention Secretariat within the reporting obligations, and correspond otherwise with the Secretariat		0	0	0	0	0	0	0	0	0	0	0
<b>TOTAL ACTION PLAN 3.3.14</b>	30	15										45
<b>ACTION PLAN 3.3.15: PUBLIC AWARENESS, INFORMATION AND PUBLIC EDUCATION (ARTICLE 10)</b>												
<b>Main Objective 1. Education and raising awareness of the public and target groups</b>												
<b>Specific Objective 1.1. Developed effective instruments for information on POPs chemicals</b>												
<b>Activity 1.1.1</b> Prepare a detailed plan to inform the public about the impacts of POPs, which will define specific programs to raise awareness and educate the public	30											30
<b>Specific Objective 1.2. Identified stakeholders actively involved in the management and decision-making relevant to the implementation of the Stockholm Convention</b>												
<b>Activity 1.2.1</b> Implement programs to raise awareness and educate the public (described above under the "develop effective instruments for information on POPs chemicals"): organization of seminars and workshops for the sound management of POPs chemicals at various POPs groups for capacity-building of industry, administration, executive, legislative and judicial authorities and other stakeholders, including the preparation of educational materials	30	40	30									100
<b>Activity 1.2.2</b> Organize periodic meetings and workshops inviting citizens to participate and where qualified persons would talk about POPs: what they are, where to find them, how dangerous they are, the latest information about POPs in BiH, sources of POPs ...	10		10		10		10		10			50
<b>Specific Objective 1.3. Activities undertaken to educate and raise awareness among target groups (decision makers, executives, industry, public) on obligations under the Convention (developed and implemented non-cyclical aspects of education as a form of lifelong learning, starting from university specialization to tailor-made courses aimed at employees of bodies administration, institutions nominated for the implementation of certain segments of the Stockholm Convention, as well as employees in the industry)</b>												
<b>Activity 1.3.1</b> Prepare and distribute information materials on POPs chemicals for different population groups (children, youth, the general public, etc.)		10										10
<b>Activity 1.3.2</b> Prepare and distribute a manual for professional and technical persons on the identification and safe handling and management of hazardous waste containing POPs chemicals	20											20

207 Exact needed amount will be identified once the follow activities are implemented: 2.1.1, 2.1.5 i 2.1.7

Year Activities	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
<b>Activity 1.3.3</b> Develop and implement programs for further education of teachers for Nature and the Society for the lower elementary grades, and courses of Biology and Chemistry for higher grades of elementary school and secondary school, whereby they would be introduced to the public health problem of POPs substances and their impact on the environment, and motivate students and direct them towards understanding the principles of sustainable development, the reduction of waste production (especially those containing POPs) and generally caring for the environment. Education programs should be tailored to the level of students' knowledge to which teachers need to convey this knowledge.	5	10	10									25
<b>Activity 1.3.4</b> Launch programs whereby students in the upper grades of elementary school (8 <sup>th</sup> , 9 <sup>th</sup> grade), through chemistry and biology, would be introduced to POPs, their sources and harmful effects on health		1	1	1	1	1	1	1	1	1	1	10
<b>Activity 1.3.5</b> Launch programs whereby secondary school students would be introduced, through chemistry and biology and other courses (depending on concentration), related to POPs, their chemical properties, sources and harmful effects on health and the environment		1	1	1	1	1	1	1	1	1	1	10
<b>Activity 1.3.6</b> Develop lifelong learning programs at the level of university specialization that would represent a form of lifelong learning and a way of acquiring additional qualifications for persons who are members of previously identified target groups		5	5	5								15
<b>Activity 1.3.7</b> Organize periodic public surveys on awareness of the effects of POPs for the purpose of public opinion polls and level of public awareness	2		2		2		2		2			10
<b>Specific Objective 1.4. Design and implementation of formal university education of I and in particular, II and III cycle that would be related to the understanding of structures of chemicals and their impact on wildlife, management of chemicals, management of waste generated from the use of chemicals, and monitoring the concentration of POPs in the environment, living organisms and human food</b>												
<b>Activity 1.4.1</b> Include questions about POPs chemicals in the official educational programs of formal university education under 1 <sup>st</sup> cycle: the studies related to environmental protection (concentration at natural sciences schools, technology, ecology, ...) introduce systematic and detailed introduction to POPs: structure, obtaining, identification, impact on health and the environment through courses related to chemistry and elective courses		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	25
<b>Activity 1.4.2</b> Prepare and implement interdisciplinary 2 <sup>nd</sup> and 3 <sup>rd</sup> cycle studies that address environmental issues, public health issues and contamination of food, water, biomes and POPs; scholarships for students of the 3 <sup>rd</sup> cycle related to POPs		2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5	25
<b>Main Objective 2. Providing public access to all information related to the implementation of the Stockholm Convention, the monitoring results and the results of medical studies on the potential impacts of POPs on the population in BiH</b>												
<b>Specific Objective 2.1. Developed system of information and cooperation among relevant governmental institutions nominated by law as responsible and accountable for enforcement of obligations under the Stockholm Convention, the public sector, NGOs and the public</b>												
<b>Activity 2.1.1</b> Nominate an institution at the state level that would be responsible for the collection, classification and disclosure of information related to POPs, primarily monitoring results. Develop a precisely defined procedure for obtaining relevant information from all institutions and bodies involved in the activity related to POPs	0											0
<b>Activity 2.2.2</b> Establish and regularly update the website where the previously nominated institutions published all relevant information related to the Stockholm Convention and POPs as such, and the situation related to POPs chemicals in BiH	1	1	1	1	1	1	1	1	1	1		10
<b>Specific Objective 2.2. Comprehensive information on the Convention and environmental aspects, as well as information relating to monitoring results, exposure of humans and the environment and activity in reducing the formation and emission of POPs available to the public with adequate infrastructure of information management</b>												







Year	2015	2016	2017	2018	2019	2020	2021	2022	2023	2024	2025	Total cost (1,000 BAM)
Activity 2.2.2 Nominate institutions and implement programs to reduce the impact and risk of exposure of target population to POPs substances					1,200							1,200
Activity 2.2.3 Establish periodic monitoring program to track the effectiveness of the proposed activities and implement this monitoring					30	45						75
TOTAL ACTION PLAN 3.3.16	6	1,890	2,590	2,863	1,245	45						8,639
ACTION PLAN 3.3.19: TECHNICAL AND FINANCIAL ASSISTANCE (ARTICLES 12 AND 13)												
Elaborated in the textual part of the document.												

## 3.5 RESOURCE REQUIREMENTS FOR NIP IMPLEMENTATION

The estimate of resource requirements is based on cost assessment in specific action plans and strategies. Table 187 provides the overall overview of funds necessary for NIP implementation.

*Table 187:  
Funds necessary for NIP  
implementation*

Action Plan	Estimated resource requirements (BAM)	Comments
ACTION PLAN 3.3.1: Institutional and regulatory strengthening measures	246,000 BiH: 100,000 FBiH: 58,000 RS: 28,000 BD: 60,000	The plan identified the Environmental Protection Fund of BD as an activity, but the resources of 200,000 KM necessary for its establishment (taken from the draft Environmental Protection Strategy of BD for 2013-2023) is not included in this action plan
ACTION PLAN 3.3.3: Production, import, export, use, supplies and POPs pesticide waste (Annex A, dio I)	272,000 FBiH: 115,500 RS: 100,000 BD: 56,500	-
ACTION PLAN 3.3.4: Production, import and export, use, identification, marking, removal, storage and disposal of PCB and equipment containing PCBs (Annex A, part II)	736,500 BiH: 110,000 FBiH: 344,000 RS: 216,000 BD: 66,500	Total estimated funding for implementation of this action plan does not include costs for replacement of equipment and its disposal, as well as costs of establishment of temporary hazardous waste storage sites. It will be possible to estimate these costs after Activity 3.1.5, Activity 4.1.2 and Activity 4.1.3 of this Action Plan are completed.
ACTION PLAN 3.3.5: Production, import and export, use, supplies and hexaBDE and heptaBDE waste (Annex A, part IV) and tetraBDE and pentaBDE (Annex A, part V) and HBB, where applicable (Annex A, part I)	557,000 BiH: 115,000 FBiH: 185,000 RS: 173,000 BD: 84,000	Does not include the cost of establishing authorized operators to manage WEEE in RS and BD, estimated at 750,000 KM per entity.
ACTION PLAN 3.3.7: Production, import and export, use, supplies and waste of PFOS, its salts and PFOSF (Annex B, part III)	320,000 BiH: 10,000 FBiH: 135,000 RS: 123,000 BD: 52,000	
ACTION PLAN 3.3.9: Measures to reduce releases from unintentional production	554,500 BiH: 10,000 FBiH: 270,500 RS: 207,500 BD: 66,500 KM + 25 – 35 million	For implementation of BAT/BEP measures in the production of iron and non-ferrous metals. Funding should be secured from international funds.
Strategy with Action Plan 3.3.13: Identification of contaminated sites (Annex A, B and C) and environmentally-friendly rehabilitation	960,000 FBiH: 533,000 RS: 355,000 BD: 72,000 KM	Implementation costs do not include rehabilitation of priority sites contaminated by POPs. The exact amount necessary will be determined after Activities 2.1.1, 2.1.5 and 2.1.7 of this Strategy and Action Plan are implemented.

Action Plan	Estimated resource requirements (BAM)	Comments
ACTION PLAN 3.3.14: Facilitating of and information exchange in general	45,000 BiH: 30,000 FBiH: 5,000 RS: 5,000 BD: 5,000	-
ACTION PLAN 3.3.15: Raising awareness, information and education of the public	380,000 BiH: 77,500 FBiH: 120,000 RS: 120,000 BD: 62,500	-
ACTION PLAN 3.3.18: Research, development and monitoring	8,639,000 FBiH: 4,146,980 RS: 3,628,170 BD: 863,850	-
<b>TOTAL FOR NIP IMPLEMENTATION</b>	<b>12,710,000</b> <b>BiH: 452,500</b> <b>FBiH: 5,912,980</b> <b>RS: 4,955,670</b> <b>BD: 1,388,850</b>	<b>+ 25 – 35 million BAM</b> For implementation of BAT/BEP measures in the production of iron and non-ferrous metals from Action Plan 3.3.9. Funding needs to be provided from international sources.

Items that have not been estimated in Action Plans and Strategies, and which represent significant costs, are listed in Table 187. It will be possible to estimate these costs during NIP implementation, once specific activities have been implemented. Bosnia and Herzegovina does not have sufficient funding for the implementation of planned activities so competent institutions should apply for additional financial support from international organizations, bodies of the Stockholm Convention, per articles 12 and 13 of the Convention.



# ANNEXES



## Annex 1- PNSC members

No.	Representative	Institution	Position relevant to the Project
1.	Nermína Skejović Hurić	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina	Stockholm Convention NFP
2.	Azra Rogović Grubić	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina	Montreal Protocol NFP
3.	Sabina Šahman Salihbegović	Ministry of Civil Affairs of Bosnia and Herzegovina	Senior associate for information systems in healthcare
4.	Smiljana Knežević	Administration of Bosnia and Herzegovina for Plant Health Protection	Rotterdam Convention NFP
5.	Sanja Čustović	Federal Ministry of Health	Senior associate in sector of pharmacy
6.	Azra Bašić	Federal Ministry of Environment and Tourism	Basel Convention NFP
7.	Nina Pajović	Ministry of Health and Social Welfare of Republika Srpska	Senior associate for chemicals management
8.	Svjetlana Radusin	Ministry of Physical Planning, Civil Engineering and Ecology of Republika Srpska	Assistant Minister for environmental protection
9.	Snježana Lugonjić	Brcko District Government - Department of Health and other services	Head of Department of Health
10.	Ishak Abdurahmanović	Brcko District Government – Department of Spatial Planning, Urbanism and Environmental Protection	Senior associate for Environmental protection

## Annex 2- Members of inventory groups

Name	Position in the Project	Institution
<b>POPs Pesticides Inventory Group</b>		
Mihajlo Marković	The author of the text, Group leader	Faculty of Agriculture, University of Banja Luka (Institute for the Agroecology and Soil Sciences)
Siniša Mitrić	The author of the text, Group member	Faculty of Agriculture Banja Luka
Osman Mujezinović	Group member	University of Sarajevo, Faculty of Forestry
Selma Leko	Group member	Institute for Public Health of the Federation of Bosnia and Herzegovina
Mario Beus	Group member	Federal Ministry of Agriculture, Water Management and Forestry
Vojislav Trkulja	Group member	Agricultural Institute of Republika Srpska
Jelena Anđić	Group member	EKOBEL, Head of Development Sector and Team Leader for IMS
Kristina Simić	Group member	Public Health Institute of Republika Srpska
Nikolina Marčeta	Group member	Ministry of Agriculture, Forestry and Water Management of Republika Srpska
Džejna Milaković - Ramadani	Group member	Ministry of Health and Social Welfare of Republika Srpska
<b>PCB Inventory Group</b>		
Maja Maretić Tiro	The author of the text, Group leader	Enova
Mirsad Madeško	The author of the text, Group member	Enova
Predrag Ilić	Group member	Institute of Protection and Ecology of Republika Srpska
Nermína Skejović Hurić	Group member	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina

Name	Position in the Project	Institution
Kristina Simić	Group member	Public Health Institute of Republika Srpska
Sanja Jelavić	Group member	JP Elektroprivreda HZ HB d.d. Mostar
Radmila Kostić	Group member	Ministry of Physical Planning, Civil Engineering and Ecology of Republika Srpska
Boris Lubarda	Group member	Ministry of Industry, Energy and Mining of Republika Srpska
<b>PCDD/ PCDF Inventory Group</b>		
Predrag Ilić	The author of the text, Group leader	Institute of Protection and Ecology of RS
Svetlana Ilić	The author of the text, Group member	Institute of Protection and Ecology of RS
Vesna Mitrić	The author of the text, Group member	Institute of Protection and Ecology of RS
Mara Bojić	Group member	Environmental Protection and Energy Efficiency Fund of RS
Tatjana Kapetanović	Group member	Environmental Fund of the Federation of Bosnia and Herzegovina
Almira Kapetanović	Group member	Federal Ministry of Environment and Tourism
Ines Fejzić	Group member	Enova
Ranka Radić	Group member	Ministry of Physical Planning, Civil Engineering and Ecology of Republika Srpska
Zlatko Popović	Group member	Ministry of Industry, Energy and Mining of Republika Srpska
<b>PBDE/PFOS Inventory Group</b>		
Fethi Silajdžić	The author of the text, Group leader	Enova
Ines Fejzić	The author of the text, Group member	Enova
Ana Njego	The author of the text, Group member	Enova
Vesna Mitrić	Group member	Institute of Protection and Ecology of RS
Azra Rogović Grubić	Group member	Ministry of Foreign Trade and Economic Relations of BiH
Vico Zeljković	Group member	Fund for environmental protection and energy efficiency of the RS
Sveto Cvijić	Group member	Ministry of Physical Planning, Civil Engineering and Ecology of Republika Srpska
Duško Solomun	Group member	Ministry of Industry, Energy and Mining of Republika Srpska
<b>Health, Environment and R&amp;D Group</b>		
Miroslav Šober	The author of the text, Group leader	Faculty of Pharmacy, University of Sarajevo
Aleksandra Marjanović	Group member	Faculty of Pharmacy, University of Sarajevo
Jasmina Đedibegović	Group member	Faculty of Pharmacy, University of Sarajevo
Sabina Jukan	Group member	Aarhus centre of BiH
Osman Mujezinović	Group member	Faculty of Forestry, University of Sarajevo
Aida Vilić-Svraka	Group member	Institute for Public Health FBiH
Dušanka Danojević	Group member	Public Health Institute of Republika Srpska
Radojka Popović	Group member	Ministry of Physical Planning, Civil Engineering and Ecology of Republika Srpska
<b>POPs Legislation and Socio-economic Development Group</b>		
Lejla Tabaković	The author of the text, Group leader	Enova

Name	Position in the Project	Institution
Sonja Maličević	The author of the text, Group member	Enova
Ajla Mehmedović	The author of the text, Group member	Enova
Samir Bajrović	The author of the text, Group member	Enova
Elmedina Krilasević	Team member	Enova
Vedrana Babić	Group member	Ministry of Physical Planning, Civil Engineering and Ecology of Republika Srpska
Tomislav Ilić	Group member	Ministry of Agriculture, Forestry and Water Management of Republika Srpska
Aleksandra Vulin	Group member	Ministry of Health and Social Welfare of Republika Srpska
Mladen Lazić	Group member	Ministry of Industry, Energy and Mining of Republika Srpska

Review and revision: Rada Olbina, Phd. (Enova)

## Annex 3- List of participants at the workshops and meetings

### 1. List of participants at the Inception Workshop (Sarajevo, 28 March 2013)

No.	Representative	Institution/Organisation/Company
1.	Alma Kovačević	Ecology and Energy Center CEE
2.	Alma Mirvić	OSCE
3.	Almir Bajtarević	Cement Factory Kakanj d.d. Kakanj
4.	Almir Bijedić	Federal Hydrometeorological Institute
5.	Almira Kapetanović	Federal Ministry of Environment and Tourism
6.	Amila Hodžić Ibrulj	Agency for the Sava River Basin Sarajevo
7.	Ana Njego	Enova d.o.o. Sarajevo
8.	Anisa Avdaković	Public enterprise Elektroprivreda BiH d.d. – Sarajevo
9.	Antonija Višekruna	Aluminij d.d. Mostar
10.	Azra Rogović- Grubić	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
11.	Bojan Vujić	Bosnalijek Pharmaceutical and Chemical Industry, d.d.
12.	Danijela Sedić	Agency for the Sava River Basin Sarajevo
13.	Danka Šikuljak	Oil Refinery Modriča
14.	Dina Šehović	Federal Ministry of Health
15.	Dražen Tomić	Brčko District Government - Department of Health
16.	Dušanka Tomanović	RS Elektroprivreda, Trebinje
17.	Duška Kudra	NGO "Environment Protection Center", Banja Luka
18.	Dženita Konjić	Food Safety Agency of Bosnia and Herzegovina
19.	Emina Dedić	Cement Factory Kakanj d.d. Kakanj
20.	Enes Šeperović	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
21.	Ermina Salkičević Dizdarević	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
22.	Fadila Muftić	Federal Ministry of Environment and Tourism
23.	Fethi Silajdžić	Enova d.o.o. Sarajevo
24.	Goran Mišić	Ministry of Spatial Planning and Environment of Tuzla Canton



No.	Representative	Institution/Organisation/Company
25.	Gordana Banjac	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
26.	Hajrudin Alispahić	Indirect Taxation Authority of Bosnia and Herzegovina
27.	Hazim Hrvatović	Federal Institute for Geology Sarajevo
28.	Iino Fukuya	UNIDO
29.	Ines Fejić	Enova d.o.o. Sarajevo
30.	Irena Javor Korjenić	Veterinary Office of Bosnia and Herzegovina
31.	Ishak Abdurahmanović	Brčko District Government - Department of Spatial Planning and Legal and Real Estate Affairs
32.	Jelena Vićanović	Public Institute „Vode Srpske“ Bijeljina
33.	Maja Maretić-Tiro	Enova d.o.o. Sarajevo
34.	Majda Čakarić	SISECAM Soda Lukavac d.o.o.
35.	Mara Bojić	Environmental Protection and Energy Efficiency Fund of Republika Srpska
36.	Marinko Antunović	Agency for the Adriatic Basin Mostar
37.	Melina Džajić - Valjevac	Hydro-engineering Institute Sarajevo
38.	Mihajlo Marković	University of Banja Luka, Faculty of Agriculture, Institute for the Agroecology and Soil Sciences
39.	Miroslav Šober	University of Sarajevo, Faculty of Pharmacy
40.	Mirsad Madeško	Enova d.o.o. Sarajevo
41.	Mladen Babić	University of Banja Luka, Faculty of Agriculture
42.	Nataša Kokotović	Veterinary Office of Bosnia and Herzegovina
43.	Nataša Radović	Chamber of Commerce of Republika Srpska
44.	Nermina Skejović - Hurić	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
45.	Nina Pajović	Ministry of Health and Social Production of Republika Srpska
46.	Osman Mujezinović	University of Sarajevo, Faculty of Forestry
47.	Predrag Ilić	Institute for Protection and Ecology of Republika Srpska, Banja Luka
48.	Sabina Jukan	Aarhus Center Sarajevo
49.	Sanela Džino	Agency for the Sava River Basin Sarajevo
50.	Sanela Spahić	Public enterprise Elektroprivreda BiH d.d. – Sarajevo, Subsidiary „Elektrodistribucija“, Sarajevo
51.	Sanja Jelavić	Public enterprise Elektroprivreda HZ HB d.d. Mostar
52.	Sanja Sarajlija	Enova d.o.o. Sarajevo
53.	Sead Ivojević	University of Sarajevo, Faculty of Forestry
54.	Selma Mašnić	Prevent BH d.o.o.
55.	Senad Hromić	Foreign Trade Chamber of Bosnia and Herzegovina
56.	Smiljana Knežević	Administration of Bosnia and Herzegovina for Plant Health Protection
57.	Stojanka Tankosić	Oil Refinery Brod a.d.
58.	Stupar Svjetlana	Republic Hydrometeorological Service of Republika Srpska
59.	Svetlana Ilić	Institute for Protection and Ecology of Republika Srpska, Banja Luka
60.	Tatjana Kapetanović	Environmental Fund of the Federation of BiH
61.	Vesna Mitrić	Institute for Protection and Ecology of Republika Srpska, Banja Luka
62.	Zijada Redžić	Federation Ministry of Agriculture, Water Management and Forestry
63.	Zlatko Đajić	Republic Hydrometeorological Service of Republika Srpska

## 2. List of participants at the Training Workshop (Sarajevo, 214-16 May 2013)

No.	Representative	Institution/Organisation/Company
1.	Nermina Skejović Hurić	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
2.	Azra Rogović Grubić	
3.	Almira Kapetanović	Federal Ministry of Environment and Tourism

No.	Representative	Institution/Organisation/Company
4.	Mario Beus	Federal Ministry of Agriculture, Water Management and Forestry
5.	Goran Mišić	Ministry of Physical Planning and Environmental Protection of Tuzla Canton
6.	Dragana Zec	Ministry of Agriculture, Forestry and Water Management of Republika Srpska
7.	Ana Mrnjavac	Indirect Taxation Authority of Bosnia and Herzegovina
8.	Tatjana Kapetanović	Environmental Fund of the Federation of BiH
9.	Mara Bojić	Environmental Protection and Energy Efficiency Fund of Republika Srpska
10.	Vico Zeljković	
11.	Mihajlo Marković	Faculty of Agriculture of University of Banja Luka
12.	Siniša Mitrić	
13.	Selma Leko	Institute for Public Health of the Federation of Bosnia and Herzegovina
14.	Kristina Simić	Public Health Institute of Republika Srpska
15.	Jelena Andić	ECO-Bel
16.	Sabina Jukan	Association of Aarhus Centre in Bosnia and Herzegovina
17.	Ermina Hanjalić	Indirect Taxation Authority of Bosnia and Herzegovina
18.	Sanela Spahić	Public enterprise Elektroprivreda BiH d.d. – Sarajevo
19.	Rada Olbina	NEA (Consortium of companies Enova d.o.o. Sarajevo and Institute for Protection and Ecology of Republika Srpska, Banja Luka)
20.	Ana Njego	
21.	Fethi Silajdžić	
22.	Ines Fejzić	
23.	Maja Maretić Tiro	
24.	Mirsad Madeško	
25.	Sanja Sarajlija	
26.	Predrag Ilić	
27.	Vesna Mitrić	

### 3. List of Participants at the First Meeting of Inventory Groups (Vlasic, 11 September 2013)

No.	Representative	Institution/Organisation/Company
1.	Nermina Skejović Hurić	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
2.	Azra Rogović Grubić	
3.	Zijada Redžić	Federal Ministry of Agriculture, Water Management and Forestry
4.	Goran Mišić	Ministry of Physical Planning and Environmental Protection of Tuzla Canton
5.	Mihajlo Marković	Faculty of Agriculture of University of Banja Luka
6.	Siniša Mitrić	
7.	Bosiljka Stojanović	Coal mine and TPP Ugljevik
8.	Selma Leko	Institute for Public Health of the Federation of Bosnia and Herzegovina
9.	Kristina Simić	Public Health Institute of Republika Srpska
10.	Sabina Jukan	Association of Aarhus Centre in Bosnia and Herzegovina
11.	Aleksandra Marjanović	Faculty of Pharmacy of University of Sarajevo
12.	Miroslav Sober	
13.	Ana Njego	
14.	Ines Fejzić	
15.	Maja Maretić Tiro	
16.	Mirsad Madeško	
17.	Predrag Ilić	
18.	Svetlana Ilić	

#### 4. List of Participants at the Preliminary Inventory Workshop (Banja Luka, 18 February 2014)

No.	Representative	Institution/Organisation/Company
1.	Aleksandra Vulin	Ministry of Agriculture, Forestry and Water Management RS
2.	Almir Bajtarević	Heidelberg Cement, Kakanj
3.	Almira Kapetanović	Federal Ministry of Environment and Tourism
4.	Amila Selmanagić Bajrović	UNDP
5.	Ana Mrnjavac	Indirect Taxation Authority of BiH Sarajevo
6.	Anđelija Šikman	EKO-BEL d.o.o.
7.	Azra Bašić	Federal Ministry of Environment and Tourism
8.	Azra Rogović- Grubić	Ministry of Foreign trade and Economic Relations of Bosnia and Herzegovina
9.	Boris Lubarda	Ministry of Industry, Energy and Mining RS
10.	Bosiljka Stojanović	RITE Ugljevik
11.	Danka Šikuljak	Oil Refinery Modriča
12.	Dina Šehović	Federal Ministry of Health
13.	Dušanka Tomanović	Power Utility of the Republic of Srpska, Parent company Trebinje
14.	Duška Kudra	NGO "Environment Protection Center", Banja Luka
15.	Duško Solomun	Ministry of Industry, Energy and Mining RS
16.	Enis Omerčić	Federal Institute for Hydrometeorology
17.	Fadila Muftić	Federal Ministry of Environment and Tourism
18.	Goran Jovanović	TPP and coal mine Ugljevik
19.	Iino Fukuya	UNIDO
20.	Ines Fejzić	Enova d.o.o. Sarajevo
21.	Jelena Vićanović	Public institution "Vode Srpske" RS
22.	Kristina Simić	Public Health Institute RS
23.	Maja Maretić Tiro	Enova d.o.o. Sarajevo
24.	Majda Čakarić	SISECAM Soda Lukavac d.o.o.
25.	Marinko Antunović	Agency for the Adriatic Basin Mostar
26.	Melisa Džonlić	Hydro-engineering Institute Sarajevo
27.	Miroslav Šober	Faculty of Pharmacy University of Sarajevo
28.	Mirsad Madeško	Enova d.o.o. Sarajevo
29.	Nermina Skejović - Hurić	Ministry of Foreign trade and Economic Relations of Bosnia and Herzegovina
30.	Nikolina Marčeta	Ministry of Agriculture, Forestry and Water Management RS
31.	Nina Pajović	RS Ministry of Health and Social Production
32.	Predrag Ilić	Institute of Protection, Ecology and Institution Banja Luka
33.	Radić Ranka	RHHZ
34.	Radmila Kostić	Ministry of Spatial Planning, Civil Engineering and Ecology RS
35.	Sabina Jukan	Aarhus Centre Sarajevo
36.	Sabina Šahman Salihbegović	Ministry of Civil Affairs of Bosnia and Herzegovina
37.	Sanela Spahić	Public enterprise Elektroprivreda BiH d.d. – Sarajevo, Subsidiary „Elektro distribucija“, Sarajevo
38.	Sanja Jelavić	Public enterprise Elektroprivreda HZ HB d.d. Mostar
39.	Selma Leko	Institute for Public Health of the Federation of BiH
40.	Slavko Kovačević	Oil refinery Brod
41.	Slobodanka Čekić	Veterinary Office of Bosnia and Herzegovina
42.	Smiljana Knežević	Administration Bosnia and Herzegovina for Plant Health Protection
43.	Sonja Maličević	Enova d.o.o. Sarajevo

No.	Representative	Institution/Organisation/Company
44.	Stojanka Tomkosić	Oil refinery Brod
45.	Stupar Sveltana	Republic Institute for Hydrometeorology RS
46.	Tomislav Ilić	Ministry of Health and Social Welfare
47.	Valentina Petković	Oil refinery Modriča
48.	Vedrana Babić	Ministry of Spatial Planning, Civil Engineering and Ecology RS
49.	Zdravko Čuljak	Public enterprise Elektroprivreda HZ HB d.d. Mostar
50.	Zlatko Đajić	Public Institute for Hydrometeorology Banja Luka
51.	Zlatko Popović	Ministry of Industry, Energy and Mining RS
52.	Zoran Lukač	Fund for Environmental Protection and Energy Efficiency of republika Srpska

#### 5. List of Participants at the Priority Validation Workshop (Sarajevo, 24 April 2014)

No.	Representative	Institution/Organisation/Company
1.	Aleksandra Vulin	Ministry of Agriculture, Forestry and Water Management RS
2.	Almir Bajtarević	Heidelberg Cement, Kakanj
3.	Amila Selmanagić Bajrović	UNDP
4.	Ana Mrnjavac	Indirect Taxation Authority of BiH Sarajevo
5.	Azra Bašić	Federal Ministry of Environment and Tourism
6.	Bojan Vujisić	Bosnalijek
7.	Boris Lubarda	Ministry of Industry, Energy and Mining RS
8.	Bosiljka Stojanović	RiTE Ugljevik
9.	Dina Šehović	Federal Ministry of Health
10.	Dušanka Danojević	Public Health Institute RS
11.	Dušanka Tomanović	Power Utility of the Republic of Srpska, Parent company Trebinje
12.	Džejna Milaković-Ramadani	RS Ministry of Health and Social Production
13.	Edisa Trunić	Federal Ministry of Health
14.	Eldina Huskić	Public enterprise Elektroprivreda BiH d.d. – Sarajevo, Subsidiary „Elektrodistribucija“, Sarajevo
15.	Elma Hadžić Ramić	Environmental Fund of the FBiH
16.	Fadila Muftić	Federal Ministry of Environment and Tourism
17.	Fethi Silajdžić	Enova d.o.o Sarajevo
18.	Goran Mišić	Federal Ministry of Physical Planning and environmental protection Tuzla canton
19.	Ishak Abdurahmanović	Government of Brcko District, Department of Spatial Planning, Urbanism and Environment
20.	Jelena Vićanović	Public institution "Vode Srpske" RS
21.	Jesenka Jahić	Ministry of Agriculture, Water Management and Forestry FBiH
22.	Kristina Simić	Public Health Institute RS
23.	Maja Maretić-Tiro	Enova d.o.o. Sarajevo
24.	Majda Čakarić	SISECAM Soda Lukavac d.o.o.
25.	Maren Mellendorf	UNIDO
26.	Marinko Antunović	Agency for the Adriatic Basin Mostar
27.	Melisa Džonlić	Hydro-engineering Institute Sarajevo
28.	Miroslav Šober	Faculty of Pharmacy, University of Sarajevo
29.	Nebojša Lukić	Fund for Environmental Protection and Energy Efficiency RS
30.	Nermina Skejović - Hurić	Ministry of Foreign trade and Economic Relations of Bosnia and Herzegovina
31.	Nezafeta Sejdić	Agency for the Sava River Basin District
32.	Nijaz Bajramović	Food Safety Agency of BiH
33.	Nina Pajović	RS Ministry of Health and Social Production

No.	Representative	Institution/Organisation/Company
34.	Pašan Šehović	Federal Ministry of Health
35.	Predrag Ilić	Institute of Protection, Ecology and Institution Banja Luka
36.	Radmila Kostić	Ministry of Spatial Planning, Civil Engineering and Ecology RS
37.	Ranka Radić	RHHZ
38.	Rejhana Džaka	Public enterprise Elektroprivreda BiH d.d. – Sarajevo, Subsidiary „Elektro distribucija“, Sarajevo
39.	Sabina Šahman Salihbegović	Ministry of Civil Affairs of Bosnia and Herzegovina
40.	Sanela Džino	Agency for the Sava River Basin District
41.	Sanela Spahić	Public enterprise Elektroprivreda BiH d.d. – Sarajevo Subsidiary „Elektro distribucija“, Sarajevo
42.	Sanja Jelavić	Public enterprise Elektroprivreda HZ HB d.d. Mostar
43.	Selma Leko	Institute for Public Health FBiH
44.	Siniša Mitrić	University of Banja Luka Faculty of Agriculture
45.	Sissel Brit Ranneklev	Norwegian Institute for Water Research (NIVA)
46.	Slobodanka Čekić	Veterinary Office of Bosnia and Herzegovina
47.	Smiljana Knežević	Administration Bosnia and Herzegovina for Plant Health Protection
48.	Sonja Maličević	Enova d.o.o. Sarajevo
49.	Stojanka Tankosić	Oil refinery Brod
50.	Stupar Svjetlana	Republic Institute for Hydrometeorology RS
51.	Tatjana Kapetanović	Fund for Environmental Protection FBiH
52.	Vesna Mitrić	Institute of Protection, Ecology and Institution Banja Luka
53.	Zijada Redžić	Federal Ministry of Agriculture, Water and Forestry
54.	Zlatko Đajić	Public Institute for Hydrometeorology Banja Luka
55.	Zlatko Popović	Ministry of Industry, Energy and Mining RS

#### 6. List of Participants at the Second Meeting of Inventory Groups (Teslic, 22 July 2014)

No.	Representative	Institution/Organisation/Company
1.	Azra Bašić	Federal Ministry of Environment and Tourism
2.	Boris Lubarda	Ministry of Industry, Energy and Mining of Republika Srpska
3.	Branimir Filipović	Government of Brčko District
4.	Dajana Kelečević	Fund for Environmental Protection and Energy Efficiency of RS
5.	Dužanka Danojević	RS Ministry of Health and Social Welfare
6.	Džejna Milaković-Ramadani	RS Ministry of Health and Social Welfare
7.	Fadila Muftić	Federal Ministry of Environment and Tourism
8.	Fethi Silajdžić	Enova d.o.o Sarajevo
9.	Iino Fukuya	UNIDO
10.	Ines Fejzić	Enova d.o.o. Sarajevo
11.	Ishak Abdurahmanović	Government of Brčko District, Department of Spatial Planning, Urbanism and Environment
12.	Maja Maretić-Tiro	Enova d.o.o. Sarajevo
13.	Mario Beus	Federal Ministry of Agriculture, Water Management and Forestry
14.	Mihajlo Marković	Faculty of Agriculture, University of Banja Luka
15.	Miroslav Šober	Faculty of Pharmacy, University of Sarajevo
16.	Mladen Lazić	Ministry of Industry, Energy and Mining of Republika Srpska
17.	Nermina Skejović - Hurić	Ministry of Foreign Trade and Economic Relations of Bosnia and Herzegovina
18.	Radmila Kostić	Ministry of Spatial Planning, Civil Engineering and Ecology of Republika Srpska

No.	Representative	Institution/Organisation/Company
19.	Ranka Radić	Hydrometeorological Institute of Republika Srpska
20.	Sabina Jukan	Aarhus Centre Sarajevo
21.	Sabina Šahman Salihbegović	Ministry of Civil Affairs of Bosnia and Herzegovina
22.	Selma Leko	Institute for Public Health of Federation of Bosnia and Herzegovina
23.	Smiljana Knežević	Administration of Bosnia and Herzegovina for Plant Health Protection
24.	Sveto Cvijić	Ministry of Spatial Planning, Civil Engineering and Ecology of Republika Srpska
25.	Svjetlana Stupar	Hydrometeorological Institute of Republika Srpska
26.	Vesna Mitrić	Institute of Protection, Ecology and Informatics, Banja Luka
27.	Vojislav Trkulja	Institute of the agriculture of Republika Srpska
28.	Zlatko Popović	Ministry of Industry, Energy and Mining of Republika Srpska

#### 7. List of Participants at the Final Workshop (Sarajevo, 27 October 2014)

No.	Representative	Institution/Organisation/Company
1.	Aleksandra Vulin	Ministry of Agriculture, Forestry and Water Management RS
2.	Almir Bajtarević	Heidelberg Cement, Kakanj
3.	Almira Kapetanović	Federal Ministry of Environment and Tourism
4.	Amela Kurtćehajić	Eletroprenos-Elektroprijenos BiH, Banja Luka
5.	Amgijada Karišik	Eletroprenos-Elektroprijenos BiH, Banja Luka
6.	Amila Selmanagić Bajrović	UNDP
7.	Ana Mrnjavac	Indirect Taxation Authority of BiH Sarajevo
8.	Anisa Avdaković	Public enterprise Elektroprivreda BiH d.d. – Sarajevo
9.	Anisa Čičić Močić	Agency for the Sava River Basin District
10.	Azra Bašić	Federal Ministry of Environment and Tourism
11.	Azra Rogović Grubić	Ministry of Foreign trade and Economic Relations of Bosnia and Herzegovina
12.	Bojan Vujisić	Bosnalijek
13.	Boris Lubarda	Ministry of Industry, Energy and Mining RS
14.	Branimir Filipović	Government of Brcko District
15.	Danijela Sedić	Agency for the Sava River Basin District
16.	Dina Šehović	Federal Ministry of Health
17.	Eldina Žukić	Public enterprise Elektroprivreda BiH d.d. – Sarajevo
18.	Elma Hadžić Ramić	Environmental Fund of the FBIH
19.	Emina Alić	UNIDO
20.	Erminda Hanjalić	Indirect Taxation Authority of BiH Sarajevo
21.	Enis Krečinić	Federal Institute for Hydrometeorology
22.	Fethi Silajdžić	Enova d.o.o Sarajevo
23.	Goran Mišić	Federal Ministry of Physical Planning and environmental protection Tuzla canton
24.	Ines Fejzić	Enova
25.	Irena Javor Korjenić	Veterinary Office of Bosnia and Herzegovina
26.	Ishak Abdurahmanović	Government of Brcko District, Department of Spatial Planning, Urbanism and Environment
27.	Jelena Vićanović	Public institution "Vode Srpske" RS
28.	Jesenka Jahić	Ministry of Agriculture, Water Management and Forestry FBIH
29.	Maja Maretić-Tiro	Enova d.o.o. Sarajevo
30.	Majda Čakarić	SISECAM Soda Lukavac d.o.o.
31.	Marinko Antunović	Agency for the Adriatic Basin Mostar
32.	Marinko Vranić	Ministry of Agriculture, Forestry and Water Management RS

No.	Representative	Institution/Organisation/Company
33.	Mihajlo Marković	Faculty of Agriculture, Banja Luka
34.	Miroslav Šober	Faculty of Pharmacy, University of Sarajevo
35.	Mladen Ninković	NGO Center for Ecological Research
36.	Nermina Skejović - Hurić	Ministry of Foreign trade and Economic Relations of Bosnia and Herzegovina
37.	Nezafeta Sejdić	Agency for the Sava River Basin District
38.	Nina Pajović	RS Ministry of Health and Social Production
39.	Ranka Radić	RHHZ
40.	Rejhana Džaka	Public enterprise Elektroprivreda BiH d.d. – Sarajevo, Subsidiary „Elektrodistribucija“, Sarajevo
41.	Sabina Jukan	Aarhus Centre Sarajevo
42.	Sabina Šahman Salihbegović	Ministry of Civil Affairs of Bosnia and Herzegovina
43.	Sanela Džino	Agency for the Sava River Basin District
43.	Sanela Spahić	Public enterprise Elektroprivreda BiH d.d. – Sarajevo Subsidiary „Elektrodistribucija“, Sarajevo
44.	Sanja Jelavić	Public enterprise Elektroprivreda HZ HB d.d. Mostar
45.	Siniša Mitrić	University of Banja Luka Faculty of Agriculture
46.	Smiljana Knežević	Administration Bosnia and Herzegovina for Plant Health Protection
47.	Snježana Lugonjić	Government of Brcko District
48.	Svjetlana Stupar	Republic Institute for Hydrometeorology RS
49.	Tatjana Kapetanović	Fund for Environmental Protection FBIH
50.	Zijada Redžić	Federal Ministry of Agriculture, Water and Forestry
51.	Zlatko Đajić	Public Institute for Hydrometeorology Banja Luka
52.	Zlatko Popović	Ministry of Industry, Energy and Mining RS
53.	Zoran Lukač	Fund for Environmental Protection and Energy Efficiency

## Annex 4- Governmental institutions and organizations approached for data request and the legal basis of their competence for certain POPs chemicals

POPs Type	Legal Framework related to Chemical Management in BiH		
	BiH (state level)	FBiH	RS
POPs pesticides	Law on Ministries and Other Bodies of Administration of BiH (Official Gazette of BiH, no. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103/09)	Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06) Law on Healthcare (Official Gazette of FBiH, no. 46/10)	Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12) Law on Healthcare (Official Gazette of RS, no. 106/09) Law on Chemicals (Official Gazette of RS, no. 25/09) Law on Biocides (Official Gazette of RS, no. 37/09)
	Law on Food (Official Gazette of BiH, no.50/04)	Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06)	Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12)
	Law on Ministries and Other Bodies of Administration of BiH (Official Gazette of BiH, no. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103/09) Law on Phytopharmaceutical Substances (Official Gazette of BiH no. 49/04) Law on Plant Protection (Official Gazette of BiH no. 23/03)	Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06) Law on Waters (Official Gazette of FBiH, no. 70/06) Law on Agricultural Land (Official Gazette of FBiH, no.52/09)	Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12) Law on Plant Protection Agents Official Gazette of RS, no. 52/10).
	Law on Statistics of BiH (Official Gazette of BiH, no. 26/04)		
PCBs	Law on Ministries and Other Bodies of Administration of BiH (Official Gazette of BiH, no. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103/09)	Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06) Law on Healthcare (Official Gazette of FBiH, no. 46/10)	Law on Healthcare (Official Gazette of RS, no. 106/09) Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12) Law on Chemicals (Official Gazette of RS, no. 25/09) Law on Biocides (Official Gazette of RS, no. 37/09)
	Law on Food (Official Gazette of BiH, no.50/04)	Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06)	Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12)
	Law on Statistics of BiH (Official Gazette of BiH, no. 26/04)		
PFOS/PBDEs	Law on Ministries and Other Bodies of Administration of BiH (Official Gazette of BiH, no. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103/09)	Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06)	Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12)
		Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06) Law on Healthcare (Official Gazette of FBiH, no. 46/10)	Law on Healthcare (Official Gazette of RS, no. 106/09) Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12) Law on Chemicals (Official Gazette of RS, no. 25/09) Law on Biocides (Official Gazette of RS, no. 37/09)
	Law on Statistics of BiH (Official Gazette of BiH, no. 26/04)		



Governmental Institutions Responsible for Chemical Management						No. of Requests for Official Data	No. of Official Data Received
BD	BiH (state level)	FBiH	RS	BD			
Law on Public Administration of BD (Official Gazette of BD, no.19/07) Law on Healthcare in BD (Official Gazette of BD, no.38/11, 9/13)	Ministry of Foreign Trade and Economic Relations	Federal Ministry of Health	Ministry of Health and Social Welfare	Department of Health and Other Services	39	16	
Law on Public Administration of BD (Official Gazette of BD, no.19/07)	Food Safety Agency of BiH	Federal Ministry of Environment and Tourism	Ministry of Spatial Planning, Civil Engineering and Ecology	Department of Spatial Planning and Real Estate Affairs			
Law on Public Administration of BD (Official Gazette of BD, no.19/07)	Administration of Bosnia and Herzegovina for Plant Health Protection	Federal Ministry of Agriculture, Water Management and Forestry	Ministry of Forestry, Agriculture and Water Management	Department of Agriculture, Forestry and Water Management			
	Agency for Statistics of BiH				5	2	
Law on Public Administration of BD (Official Gazette of BD, no.19/07)	Ministry of Foreign Trade and Economic Relations	Federal Ministry of Health	Ministry of Health and Social Welfare	Department of Health and Other Services			
Law on Public Administration of BD (Official Gazette of BD, no.19/07)	Food Safety Agency of BiH	Federal Ministry of Environment and Tourism	Ministry of Spatial Planning, Civil Engineering and Ecology	Department of Spatial Planning and Real Estate Affairs Department of Agriculture, Forestry and Water Management			
	Agency for Statistics of BiH				23	7	
Law on Public Administration of BD (Official Gazette of BD, no.19/07)	Ministry of Foreign Trade and Economic Relations	Federal Ministry of Environment and Tourism	Ministry of Spatial Planning, Civil Engineering and Ecology	Department of Spatial Planning and Real Estate Affairs			
Law on Public Administration of BD (Official Gazette of BD, no.19/07)		Federal Ministry of Health	Ministry of Health and Social Welfare	Department of Health and Other Services Department of Agriculture, Forestry and Water Management			
	Agency for Statistics of BiH						

POPs Type	Legal Framework related to Chemical Management in BiH		
	BiH (state level)	FBiH	RS
PCDDs/ PCDFs	Law on Ministries and Other Bodies of Administration of BiH (Official Gazette of BiH, no. 5/03, 42/03, 26/04, 42/04, 45/06, 88/07, 35/09, 59/09 and 103/09)	Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06) Law on Healthcare (Official Gazette of FBiH, no. 46/10)	Law on Healthcare (Official Gazette of RS, no. 106/09) Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12) Law on Chemicals (Official Gazette of RS, no. 25/09) Law on Biocides (Official Gazette of RS, no. 37/09)
	Law on Food (Official Gazette of BiH, no.50/04)	Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06)	Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12)
	Law on Statistics of BiH (Official Gazette of BiH, no. 26/04)	Law on Federal Ministries and Other Bodies of the Federal Government (Official Gazette of FBiH, no.8/06) Law on Statistics of FBiH (Official Gazette of FBiH, no. 63/03, 9/09)	Law on Republic Administration of RS (Official Gazette of RS, no. 118/09, 11/09, 74/10, 86/10, 24/12 and 121/12) Law on Statistics of RS (Official Gazette of RS, no. 85/03)

## Annex 5- Management of POPs according to regulations on the level of BiH, FBiH, RS and BD

Table 5.1:  
Use and limit values  
of POPs pesticides  
according to regulations  
at BiH, FBiH, RS and  
BD level

POPs pesticide	Regulation governing the use of the substance and the key provisions	
	BiH	FBiH
Aldrin (E)	List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances) Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (defined MRL for residues) Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs established at worksites) Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)	Law on Putting into Circulation of Toxins (use and circulation of aldrin prohibited) Decision on Characterization of Surface and Ground Water, Reference Conditions and Parameters for Assessing the Status of Water and on Water Monitoring (defined environmental quality standard for annual average concentration of parameters) Regulation on Determining Permissible Amount of Harmful and Hazardous Substances in Soil and their Method of Testing (defined limit values of total Drina (aldrin + endrin + dieldrin) in soil, defined limit value of aldrin in sludge and all products from municipal wastewater)
Chlordane (E)	List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances) Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (defined MRL for residues) Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs established at worksites) Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)	Law on Putting into Circulation of Toxins (use and circulation of chlordane prohibited) Decree on Hazardous and Noxious Substances in Water (defined maximum permitted concentration in surface waters)
Dieldrin (E)	List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances) Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (defined MRL for residues) Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs established at worksites) Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)	Law on Putting into Circulation of Toxins (use and circulation of dieldrin prohibited) Decree on Hazardous and Noxious Substances in Water (defined maximum permitted concentration of total drins in surface waters) Decision on Characterization of Surface and Ground Water, Reference Conditions and Parameters for Assessing the Status of Water and on Water Monitoring (defined environmental quality standard for annual average concentration of parameters) Regulation on Determining Permissible Amount of Harmful and Hazardous Substances in Soil and their Method of Testing (defined limit values of total Drina (aldrin + endrin + dieldrin) in soil, defined limit value of dieldrin in sludge and all products from municipal wastewater)

Governmental Institutions Responsible for Chemical Management						No. of Requests for Official Data	No. of Official Data Received
	BD	BiH (state level)	FBIH	RS	BD		
	Law on Public Administration of BD (Official Gazette of BD, no.19/07)	Ministry of Foreign Trade and Economic Relations	Federal Ministry of Health	Ministry of Health and Social Welfare	Department of Health and Other Services	16	12
	Law on Public Administration of BD (Official Gazette of BD, no.19/07)	Food Safety Agency of BiH	Federal Ministry of Environment and Tourism	Ministry of Spatial Planning, Civil Engineering and Ecology	Department of Spatial Planning and Real Estate Affairs		
	Law on Public Administration of BD (Official Gazette of BD, no.19/07) Law on Statistics of BiH (Official Gazette of BiH, no. 26/04) Law on Statistical Bureau of BD (Official Gazette of BD, no. 4/01)	Agency for Statistics of BiH	Federal Institute of Statistics	Institute of Statistics of RS	Agency for Statistics of BiH - Office in Brcko		

RS	BD
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p> <p>Decree on Water Classification and Categorization of Watercourses (defined permitted limit values for certain classes of water)</p> <p>Regulation on Conditions for Discharging Wastewater into Surface Waters and the Regulation on Conditions for Discharging Wastewater into the Public Sewerage System (defined limit values)</p> <p>Regulation on Hygienic Safety of Drinking Water (defined maximum allowed quantities in drinking water)</p>	<p>Law on Putting into Circulation of Toxins (use and circulation of aldrin prohibited)</p>
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p>	<p>Law on Putting into Circulation of Toxins (use and circulation of chlordane prohibited)</p>
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p> <p>Decree on Water Classification and Categorization of Watercourses(defined permitted limit values for certain classes of water)</p> <p>Regulation on Conditions for Discharging Wastewater into Surface Waters and the Regulation on Conditions for Discharging Wastewater into the Public Sewerage System (defined limit values)</p>	<p>Law on Putting into Circulation of Toxins (use and circulation of dieldrin prohibited)</p>

POPs pesticide	Regulation governing the use of the substance and the key provisions	
	BiH	FBIH
Endrin (E)	<p>List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances)</p> <p>Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (defined MRL for residues)</p> <p>Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs established at worksites)</p> <p>Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)</p>	<p>Decree on Hazardous and Noxious Substances in Water (defined maximum permitted concentration in surface waters)</p> <p>Decision on Characterization of Surface and Ground Water, Reference Conditions and Parameters for Assessing the Status of Water and on Water Monitoring (defined environmental quality standard for annual average concentration of parameters)</p> <p>Regulation on Determining Permissible Amount of Harmful and Hazardous Substances in Soil and their Method of Testing (defined limit values of total DDTs (aldrin + endrins + dieldrin) in soil, defined limit value of dieldrin in sludge and all products from municipal wastewater)</p>
Heptachlor (E)	<p>List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances)</p> <p>Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (defined MRL for residues)</p> <p>Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs established at worksites)</p> <p>Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)</p>	<p>Law on Putting into Circulation of Toxins (use and circulation of heptachlor prohibited)</p> <p>Decree on Hazardous and Noxious Substances in Water (defined maximum permitted concentration in surface waters)</p> <p>Regulation on Determining Permissible Amount of Harmful and Hazardous Substances in Soil and their Method of Testing (defined limit values in sludge and all products from municipal wastewater)</p>
Mirex (E)	<p>List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances)</p> <p>Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)</p>	<p>None</p> <p>Decree on Hazardous and Noxious Substances in Water (defined maximum permitted concentration "of other organochlorine pesticides" in surface waters)</p>
Toxaphene (E)	<p>List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances)</p> <p>Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)</p>	<p>None</p> <p>Decree on Hazardous and Noxious Substances in Water (defined maximum permitted concentration in surface waters)</p>
Chlordecone (E)	<p>List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances)</p> <p>Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)</p>	<p>None</p> <p>Decree on Hazardous and Noxious Substances in Water (defined maximum permitted concentration "of other organochlorine pesticides" in surface waters)</p>
Alpha Hexachlorocyclohexane (E)	<p>List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances)</p> <p>Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (defined MRL for residues)</p> <p>Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs established at worksites)</p> <p>Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)</p>	<p>Law on Putting into Circulation of Toxins (use and circulation of hexachlorocyclohexane prohibited)</p> <p>Decree on Hazardous and Noxious Substances in Water (defined maximum permitted concentrations "of other organochlorine pesticides" in surface waters)</p> <p>Decision on Characterization of Surface and Ground Water, Reference Conditions and Parameters for Assessing the Status of Water and on Water Monitoring (defined environmental quality standard for annual average concentration of parameters and maximum permitted concentration of parameters)</p> <p>Regulation on Determining Permissible Amount of Harmful and Hazardous Substances in Soil and their Method of Testing (defined limit values of HCH compounds in soil, defined limit values of HCH compounds (total excluding lindane) in sludge and all products from municipal wastewater)</p>
Beta Hexachlorocyclohexane (E)	<p>List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (not included in the approved active substances)</p> <p>Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (defined MRL for residues)</p> <p>Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs established at worksites)</p> <p>Regulation on the Sanitary Safety of Drinking Water (MRLs established parameters of the safety of drinking water)</p>	<p>Law on Putting into Circulation of Toxins (use and circulation of hexachlorocyclohexane prohibited)</p> <p>Decree on Hazardous and Noxious Substances in Water (defined maximum permitted concentration "of other organochlorine pesticides" in surface waters)</p> <p>Decision on Characterization of Surface and Ground Water, Reference Conditions and Parameters for Assessing the Status of Water and on Water Monitoring (defined environmental quality standard for annual average concentration of parameters and maximum permitted concentration of parameters)</p> <p>Regulation on Determining Permissible Amount of Harmful and Hazardous Substances in Soil and their Method of Testing (defined limit values of HCH compounds in soil, defined limit values of HCH compounds (total excluding lindane) in sludge and all products from municipal wastewater)</p>

RS		BD
	<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p> <p>Decree on Water Classification and Categorization of Watercourses(defined permitted limit values for certain classes of water)</p> <p>Regulation on Conditions for Discharging Wastewater into Surface Waters and the Regulation on Conditions for Discharging Wastewater into the Public Sewerage System (defined limit values)</p>	None
	<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p> <p>Regulation on Hygienic Safety of Drinking Water (defined maximum allowed quantities in drinking water)</p>	Law on Putting into Circulation of Toxins (use and circulation of heptachlor prohibited)
	<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p>	None
	<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p>	None
	<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p>	None
	<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p> <p>Decree on Water Classification and Categorization of Watercourses(defined permitted limit values for certain classes of water)</p> <p>Regulation on Conditions for Discharging Wastewater into Surface Waters and the Regulation on Conditions for Discharging Wastewater into the Public Sewerage System (defined limit values)</p>	Law on Putting into Circulation of Toxins (use and circulation of hexachlorocyclohexane prohibited)
	<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p> <p>Decree on Water Classification and Categorization of Watercourses(defined permitted limit values for certain classes of water)</p> <p>Regulation on Conditions for Discharging Wastewater into Surface Waters and the Regulation on Conditions for Discharging Wastewater into the Public Sewerage System (defined limit values)</p>	Law on Putting into Circulation of Toxins (use and circulation of hexachlorocyclohexane prohibited)

POPs pesticide	Regulation governing the use of the substance and the key provisions	
	BiH	FBiH
Lindane (E)	<p>List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (<i>not included in the approved active substances</i>)</p> <p>Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (<i>defined MRL for residues</i>)</p> <p>Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (<i>MRLs established at worksites</i>)</p> <p>Regulation on the Sanitary Safety of Drinking Water (<i>MRLs established parameters of the safety of drinking water</i>)</p>	<p>Decree on Hazardous and Noxious Substances in Water (<i>defined maximum permitted concentration in surface waters</i>)</p> <p>Regulation on Determining Permissible Amount of Harmful and Hazardous Substances in Soil and their Method of Testing (<i>defined limit values of lindane in sludge and all products from municipal wastewater</i>)</p>
Endosulfan (E)	<p>List of Active Substances Permitted for Use in Phytopharmaceutical Agents in BiH (<i>not included in the approved active substances</i>)</p> <p>Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (<i>defined MRL for residues</i>)</p> <p>Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (<i>MRLs established at worksites</i>)</p> <p>Regulation on the Sanitary Safety of Drinking Water (<i>MRLs established parameters of the safety of drinking water</i>)</p>	<p>Decree on Hazardous and Noxious Substances in Water (<i>defined maximum permitted concentration in surface waters</i>)</p> <p>Decision on Characterization of Surface and Ground Water, Reference Conditions and Parameters for Assessing the Status of Water and on Water Monitoring (<i>defined environmental quality standard for annual average concentration of parameters and maximum permitted concentration of parameters</i>)</p>
Pentachlorobenzene (E) (N)	<p>Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (<i>MRLs established at worksites for PCB</i>)</p>	None
Hexachlorobenzene (E) (N)	<p>Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (<i>defined MRL for residues</i>)</p>	<p>Decree on Hazardous and Noxious Substances in Water (<i>defined maximum permitted concentration "of other organochlorine pesticides" in surface waters</i>)</p> <p>Decree on Conditions for Discharging Wastewaters into Natural Recipients and Public Sewerage System (<i>defined emission limit values</i>)</p>
DDT (F)	<p>Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (<i>defined MRL for residues</i>)</p> <p>Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (<i>MRLs established at worksites</i>)</p> <p>Regulation on the Sanitary Safety of Drinking Water (<i>MRLs established parameters of the safety of drinking water</i>)</p>	<p>Decision on Characterization of Surface and Ground Water, Reference Conditions and Parameters for Assessing the Status of Water and on Water Monitoring (<i>defined environmental quality standard for annual average concentration of parameters and maximum permitted concentration of parameters</i>)</p>

Table 5.2:  
Use and limit values  
of PCBs according to  
regulations at BiH,  
FBiH, RS and BD level

Substance	Regulation governing the use of the substance and the key provisions	
	BiH	FBiH
Polychlorinated biphenyl (PCB) (E) (N)	<p>Regulation on Maximum Permitted Levels for Certain Contaminants in Foodstuffs (<i>sets MPLs for dioxin-like PCBs in foodstuffs</i>)</p> <p>Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (<i>sets MRLs for PCBs at worksites</i>)</p>	<p>Decree on Hazardous and Noxious Substances in Water (<i>sets max. allowed concentrations of PCBs in surface waters</i>)</p> <p>Decree on Conditions for Discharging Wastewaters into Natural Recipients and Public Sewerage System (<i>defined emission limit values</i>)</p> <p>Regulation on Determining Permissible Amounts of Harmful and Hazardous Substances in Soil and their Method of Testing (<i>sets max. allowed concentrations of PCB in soil and sludge</i>)</p> <p>Decree on Selective Collection, Packaging and Labelling of Waste (<i>prescribes measures for selective collection, identification, storage, packaging and labelling of oils containing PCB/PCT</i>)</p>

Table 5.3:  
Use of PBDEs according  
to regulations at BiH,  
FBiH, RS and BD level

Substance	Regulation governing the use of the substance and the key provisions	
	BiH	FBiH
Hexabromodiphenyl ether and heptabromodiphenyl ether (E)	None	None

RS	BD
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p> <p>Regulation on Hygienic Safety of Drinking Water (defined maximum allowed quantities in drinking water)</p>	None
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions, noting that placing on the market and use of products containing endosulfan is allowed until 31/12/2013 if they were produced or were in use prior to the entry into force of the Regulation)</p>	None
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p>	None
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p> <p>Decree on Water Classification and Categorization of Watercourses (defined permitted limit values for certain classes of water)</p> <p>Regulation on Conditions for Discharging Wastewater into Surface Waters and the Regulation on Conditions for Discharging Wastewater into the Public Sewerage System (defined limit values)</p>	None
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</p> <p>Regulation on Conditions for Discharging Wastewater into Surface Waters and the Regulation on Conditions for Discharging Wastewater into the Public Sewerage System (defined limit values)</p> <p>Regulation on Hygienic Safety of Drinking Water (defined maximum allowed quantities in drinking water)</p>	None

RS	BD
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (noting that it is devices in use are permitted if that is not contrary to the conditions set by the regulations governing the disposal of PCBs and PCTs)</p> <p>Decree on Water Classification and Categorization of Watercourses (sets max. allowed concentrations of PCBs in surface waters)</p> <p>Regulation on Conditions for Discharging Wastewater into Surface Waters and the Regulation on Conditions for Discharging Wastewater into the Public Sewerage System (defined limit values)</p> <p>Regulation on Hygienic Safety of Drinking Water (defined maximum allowed quantities in drinking water, as well as bottled natural and processed bottled drinking water and natural mineral water)</p>	None

RS	BD
<p>Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A))—with the following exceptions: the production, placing on the market and use of products containing less than 10 mg/kg of hexabromodiphenyl and heptabromodiphenyl ether, or products produced from recycled materials or waste that is ready for reuse with less than 0.1% of these substances is allowed; products in use prior to the entry into force of this Regulation containing these substances may continue to be used.</p>	None

Substance	Regulation governing the use of the substance and the key provisions	
	BiH	FBiH
Tetrabromodiphenyl ether and pentabromodiphenyl ether (E)	None	None

Table 5.4:  
Use of PFOS according to regulations at BiH, FBiH, RS and BD level

Substance	Regulation governing the use of the substance and the key provisions	
	BiH	FBiH
Perfluorooctanesulfonic acid and its salts	None	None

Table 5.5:  
Use and limit values of PCDD/PCDF, HCB, i PCB according to regulations at BiH, FBiH, RS and BD level

Substance	Regulation governing the use of the substance and the key provisions	
	BiH	FBiH
Dioxins and furans (dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF) (N)	Regulation on Maximum Permitted Levels for Certain Contaminants in Foodstuffs (sets MPLs for dioxins in foodstuffs) Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs for furans established at worksites)	Regulation on Limit Values for Emission of Pollutants into the Air (sets limit values of PCDD/F from metal ore roasting or sintering facilities) Regulation on Conditions for the Operation of Waste Incineration Plants (sets limit values for emissions into the air for waste co-incineration; equivalency factors for PCDD/F for the purpose of determining the total concentrations of dioxins and furans; techniques for measuring concentrations in the air and water; emission limit values for discharge of wastewaters from treatment of exhaust gases; limit values of emissions into the air)
Hexachlorobenzene (HCB) (E) (N)	Regulation on Maximum Residue Levels of Pesticides In or On Food and Feed of Plant and Animal Origin of BiH (defined MRL for residues for HCB) Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs for HCB established at worksites)	Law on Putting into Circulation of Toxins (use and circulation of hexachlorobenzene prohibited)
Pentachlorobenzene (PeCB) (N)	Standard for the Maximum Allowable Concentration of Toxic Gases, Vapours and Aerosols in the Atmosphere of Workplaces (MRLs for PeCB established at worksites)	None



RS	BD
Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A)) – with the following exceptions: e production, placing on the market and use of products containing less than 10 mg/kg of tetrabromodiphenyl and pentabromodiphenyl ether, or products produced from recycled materials or waste that is ready for reuse with less than 0.1% of these substances is allowed; products in use prior to the entry into force of this Regulation containing these substances may continue to be used.	None

RS	BD
Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited substances from the Stockholm Convention – Annex 2, Part A), with the following exceptions: 1) the production, placing on the market and use of substances containing less than 10 mg/kg of PFOS or products with less than 0.1% PFOS, or less than 1 µg/m <sup>2</sup> of coated material in textiles and other coated materials is allowed, 2) products placed on the market prior to 15 Oct 2010 may continue to be used, 3) The production and placing on the market of PFOS is allowed if the amount of these substances discharged into the environment is minimized, and solely for specific purposes: a) Until 26 Aug 2015 for wetting products in controlled electroplating processes, b) For photo resistant or antireflection coatings in photolithography processes, c) For photographic coatings applied to film, paper or printing plates, d) For products for blur suppression in the process of non-decorative (VI-valence) chromium plating in closed systems, e) For hydraulic fluids in aviation; 4) the use of PFOS shall be terminated as soon as the use of safer alternatives is technically and economically feasible, and exceptions may be extended solely for the main purposes for which there are no safer alternatives or where measures taken to search for safer alternatives are reported, and the release of PFOS into the environment shall be minimized by applying the BAT.	None

RS	BD
Decree on Limit Values for Emission of Pollutants into the Air ( <i>sets limit values of PCDD/F from metal ore roasting or sintering facilities</i> ) Regulation on Conditions for the Operation of Waste Incineration Plants ( <i>sets limit values for emissions into the air for waste co-incineration; equivalency factors for PCDD/F for the purpose of determining the total concentrations of dioxins and furans; techniques for measuring concentrations in the air and water; emission limit values for discharge of wastewaters from treatment of exhaust gases; limit values of emissions into the air</i> )	Regulation on Limit Values for Emission of Pollutants into the Air ( <i>sets limit values of PCDD/F from metal ore roasting or sintering facilities</i> ) Regulation on Conditions for the Operation of Waste Incineration Plants ( <i>sets limit values for emissions into the air for waste co-incineration; equivalency factors for PCDD/F for the purpose of determining the total concentrations of dioxins and furans; techniques for measuring concentrations in the air and water; emission limit values for discharge of wastewaters from treatment of exhaust gases; limit values of emissions into the air</i> )
Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals (on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)	Law on Putting into Circulation of Toxins ( <i>use and circulation of hexachlorobenzene prohibited</i> )
Regulation on Conditions for Restriction and Prohibition of Production, Circulation and Use of Chemicals ( <i>on the List of prohibited POPs substances from the Stockholm Convention (Part A) (no exemptions)</i> )	None

## Annex 6- Development of POPs inventory in Bosnia and Herzegovina

### 1. Process of POPs pesticides inventory

During the development of the POPs pesticides inventory in Bosnia and Herzegovina, in the period from June to November 2013, the POPs Pesticides Inventory Group undertook the following activities:

- Analysis of the legal framework that regulates the issues of import and transport of pesticides in Bosnia and Herzegovina (in cooperation with the POPs Legislation Group);
- Status analysis of the pesticides, which are on the list of POPs pesticides in Bosnia and Herzegovina;
- Analysis of pesticide import into Bosnia and Herzegovina;
- Since endosulfan and lindane were not banned until 2008, the POPs pesticides inventory group considered the possibility that the companies engaged in trade of pesticides, may still have some untapped supplies of these pesticides in their warehouses. In this regard, during the month of August 2013, the POPs pesticides inventory group sent letters to companies, inquiring about any possession of POPs pesticides in their storage facilities, with special emphasis on lindane and endosulfan. Through the letters sent along with the questionnaire, the POPs pesticides inventory group became acquainted with the importers and distributors of pesticides, as well as with forest management companies, and became familiar with the concept of POPs pesticides, the types of POPs pesticides and the importance of their inventarisation;
- A survey on the importers of pesticides, as well as on forest management companies, in order to determine the residual quantities and storage sites of POPs pesticides;
- In order to ensure that the surveyed institutions, organizations and companies fully understood the issue, they were subsequently interviewed on the phone, in accordance with UNIDO's recommendations. The following questions were posed:
  1. Does your warehouse contain stocks of old pesticides? (answer YES/NO),
  2. Where are they located? (if the answer to the 1<sup>st</sup> question was YES), and
  3. Do the old stockpiles in your warehouse include lindane and endosulfan?
- For the purpose of analysing the import of pesticides into Bosnia and Herzegovina, the Indirect Taxation Authority and the Statistical Agency of Bosnia and Herzegovina were contacted, in order to obtain information on importing substances under the following tariff codes:
  - 3808 91 -- insecticides:
  - 3808 91 10 00 --- based on pyrethroids
  - 3808 91 20 00 --- based on chlorinated hydrocarbons
  - 3808 91 30 00 --- based on carbamates
  - 3808 91 40 00 --- based on organophosphorus compounds
  - 3808 91 90 00 --- others
- Analysis of the officially published studies, scientific and professional works related to measurements of the presence and content of POPs pesticides in food, soil and water in Bosnia and Herzegovina;
- Sending letters to all institutions that own laboratories and the institutions which could have information about the content of pesticide residues in general, including POPs pesticides in agricultural products, food and water;
- Processing incoming data and continuing to encourage institutions, which have not yet sent the requested data, to do so. For this purpose, after the first meeting of the groups working on developing the POPs inventory in Bosnia and Herzegovina, the POPs pesticides inventory group sent to the identified institutions and organizations, during October 2013, urgent pleas to deliver the required information.

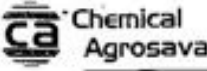




Data on import of pesticides in Bosnia and Herzegovina were obtained from the contacted Indirect Taxation Authority of Bosnia and Herzegovina only for the year 2012 and the first

9 months of the year 2013. The Indirect Taxation Authority of Bosnia and Herzegovina has aggregate data on the import of pesticides under relevant tariff codes, and therefore the collected data can be regarded as the official data.

With the aim of analyzing the trade of pesticides prior to 2012, the POPs pesticides inventory group obtained research data from the Department of Plant Protection within the Faculty of Agriculture in Banja Luka.

Data analysis was performed based on the monitoring of pesticide trade in the course of the year, by a representative of the Faculty of Agriculture in Banja Luka, at two border crossings in Bosnia and Herzegovina: Gradiška (between Bosnia and Herzegovina and Croatia) and Rača (between Bosnia and Herzegovina and Serbia), in the period from 2000 to 2008.

The trade of pesticides was monitored at these two border crossings because the largest amount of pesticides was being imported into Bosnia and Herzegovina through these crossings, regardless of which country they were coming from. As to how the data were collected, at the end of the year, the representatives of the Faculty of Agriculture in Banja Luka, copied all the import documentation for the previous year at the border crossings, and then analyzed the import of pesticides, to the extent of examining the amount of each preparation.

Sheet

Beograd 12,04,06,


AGROPEX  
OBUDOVAC

Racun #13

Naziv proizvoda	Br. koleta	Jed. mere	Kolicina	Cena/jed. mere	Ukupno EUR
1 ANTRACOL 0,2/1	20	Kom	1000	1,60	1.600,00
2 ANTRACOL 0,60/1	30	Kom	3000	0,30	900,00
3 ZATO 0,005/1	20	Kom	1000	0,40	400,00
4 RAYLETON WP25 0,005/1	20	Kom	1000	0,21	210,00
5 SABIT HANE 0,05/1	5	Kom	200	2,30	460,00
6 MATON 1/1	42	L	504	5,62	2.832,48
7 CONFIDOR 200 SL 0,005/1	125	Kom	5000	0,70	3.500,00
8 CONFIDOR 70 WG 1,25 gr	200	Kom	10000	0,37	3.700,00
9 MPISLACOL 6,1/1	25	Kom	1000	3,82	3.820,00
<b>Ukupno:</b>	<b>487</b>				<b>17.422,46</b>

Slovina: Sedamnaestihijedestistotinvedesetdvavira i 48/100.

Dat. Jugo granica  
Placanje 90 dana  
U korist: DEUTDEFF (DEUTSCHE BANK AG, FRANKFURT)  
936 8289 00  
VIBUBCS22 (Vojvodjanska banka Novi Sad, SCG)  
C573355000206200087363  
CHEMICAL AGROSAVA  
Palma Tojalija SIV Beograd, SCG  
Vozac: Arsenic Vojko B EKA 32360  
Vozak: 493-J-533  
Bruto: 1099 Kg  
Neto: 916 Kg  
Broj koleta: 487  
Matični broj CHEMICAL AGROSAVA, Beograd 7819848  
Matični broj AGROPEX Obudovac, 1378588  
Roba proizvedena u Chemical Agrosava.  
Oslobodjena PDV po članu 24 stav 2 Zakona o PDV.



Palma Tojalija SIV 11079 Novi Beograd  
V. B. 11079/2011

Trudni račun

Vrednosna marka: ZS 1807294-90  
S. 11.11.2011. 107 11079/2011

Figure 6.1:  
Example of an import  
document at the border  
crossing

## 2. Process of PCB inventory

The PCB Inventory Group has developed the PCB inventory with the aim to determine, on the one hand, the current legal status of PCBs in BiH, the former, current and future production and use of PCBs and PCB containing equipment, import, export and use of PCBs, and on the other hand to determine the existing stocks of PCBs in equipment and/or wastes containing PCBs and PCB-contaminated sites. Activities carried out by the PCB Inventory Group included the following:

- Identification of industrial plants, organizations and/or institutions in which PCBs may have been used, as well as industry and companies in BiH that could possess electrical equipment (transformers, capacitors, switches, etc.) where PCBs have been used;
- Identification of equipment in which PCBs have been used;
- Creating questionnaires for the inventory of PCB;
- Collecting data on companies that own electrical equipment (transformers, capacitors, electrical circuits, etc.) in which PCBs were used;
- Conducting surveys, sending questionnaires to the identified industrial plants, organizations and/or institutions;
- Analysis of the obtained questionnaire results;
- Analysis of import and export of PCBs in BiH;
- Analysis of officially published studies, scientific papers, statistical bulletins in relation to PCBs;
- Within field trips carried out with the aim of identification of the existence of PCBs in equipment, equipment inventory listing was performed, as well as labelling the listed equipment and sampling;
- Analysis of collected data;
- Analysis of liquid samples which could potentially contain PCBs with the help of Dextil L2000 DX analyser.

The PCB Inventory Group has contacted and collected data on companies in cooperation with the following institutions:

- Ministry of Foreign Trade and Economic Relations of BiH,
- Chamber of Economy of BiH, FBiH and RS, and
- Agency for Statistics of BiH.

The process of data collection was conducted in accordance with the matrix below.

*Table 6.1:  
Data collection process  
for PCB inventory*

Source of Data	Type of Data	Documentation Analyzed	Obtained Data
Competent ministries at entity and/or state level	Official reports regarding industrial activities, environmental plans, waste management plans, etc.	<ul style="list-style-type: none"> <li>▪ Environmental Review in Bosnia and Herzegovina, Second Review, United Nations, Geneva, 2011</li> <li>▪ Federal Waste Management Plan 2012-2017, Federation Bosnia and Herzegovina, 2011</li> </ul>	<ul style="list-style-type: none"> <li>▪ Estimated average annual quantity of PCB waste</li> <li>▪ A list of waste management companies that have environmental permit</li> <li>▪ A list of companies in the chemical sector that have environmental permit</li> </ul>
Other governmental state and entity institutions	Lists of active industries, commercial businesses	<ul style="list-style-type: none"> <li>▪ Foreign Trade Chamber of BiH: Wood Industry Bosnia and Herzegovina – Company Directory, Sarajevo, unknown year</li> <li>▪ Foreign Trade Chamber of BiH: Textile, Clothing, Leather, Footwear – Catalogue, Sarajevo, unknown year</li> </ul>	<ul style="list-style-type: none"> <li>▪ A list of producers from the sector of textiles, clothing, footwear and leather</li> <li>▪ A list of manufacturers of furniture</li> </ul>

Source of Data	Type of Data	Documentation Analyzed	Obtained Data
State and entity offices of statistics	Statistical data on industrial production, transport, waste, etc.	<ul style="list-style-type: none"> <li>▪ Agency for Statistics of BiH, First release, Environment, Waste from production activities, 2008</li> <li>▪ Agency for Statistics of BiH, First release, Environment, Waste from production activities, 2009</li> <li>▪ Federal Institute of Statistics, Waste from production activities in 2010, October 2011</li> <li>▪ Agency for Statistics of BiH, First release, Environment, Waste from production activities, 2010</li> <li>▪ Agency for Statistics of BiH, Thematic bulletin, Environment, energy, transport, Sarajevo, March 2013</li> <li>▪ Agency for Statistics of BiH, Thematic bulletin, Environment, energy, transport, Sarajevo, December 2011</li> </ul>	<ul style="list-style-type: none"> <li>▪ Quantities between non-hazardous and hazardous waste, BiH, 2008</li> <li>▪ Quantity of hazardous waste in production activities</li> <li>▪ Quantities between non-hazardous and hazardous waste, BiH, 2009</li> <li>▪ Export of hazardous waste, 2001-2009, tones</li> <li>▪ Waste containing PCB</li> </ul>
General data web-mining	Data on various industries identified in the previous steps (activities, contacts, etc.)	<ul style="list-style-type: none"> <li>▪ <a href="http://ekapija.ba">http://ekapija.ba</a></li> <li>▪ <a href="http://www.fmoit.gov.ba/download/Spisak%20firmi.pdf">http://www.fmoit.gov.ba/download/Spisak%20firmi.pdf</a></li> <li>▪ <a href="http://www.business-rs.ba/PrivredniSubjekti.aspx">http://www.business-rs.ba/PrivredniSubjekti.aspx</a></li> </ul>	<ul style="list-style-type: none"> <li>▪ A list of companies in BiH dealing with waste management and export of hazardous waste under the provisions of the Basel Convention</li> <li>▪ A list of manufacturers in the sector of textiles, clothing, footwear and leather</li> <li>▪ A list of contact information of companies</li> </ul>
Specific subjects identified in the previous steps	Data on specific processes, quantities of production and releases (via questionnaire)	<ul style="list-style-type: none"> <li>▪ Questionnaire and official letters (see Annex 5)</li> </ul>	

According to the UNEP Guidelines for the Identification of PCBs and Materials Containing PCBs, the PCB Inventory Group has identified the types of industries and applications in which it is possible to find such substances

Types of Industry or/and Organization	Applications (equipment) Possibly Containing PCB
Electricity generating companies (including transmission and distribution) and equipment	Transformers Large capacitors Small capacitors Disconnectors Voltage regulators Electric cables Switches
Production and processing industries (aluminium, copper, iron and steel, cement, chemicals, plastics, synthetic fibres, petroleum refining, pulp and paper industry)	Transformers Large capacitors Small capacitors Voltage regulators Switches Lighting
Transport (rail and road)	Transformers Large capacitors Voltage regulators Switches
Coal mines	Transformers Large capacitors Small capacitors Switches
Armed Forces (including the Ministry of Defence and military industry)	Large capacitors Small capacitors Voltage regulators Switches
Manufacture of electronics	Illumination Small capacitors Switches
Health institutions (hospitals, health centres, clinical canters, etc.)	Transformers Large capacitors Small capacitors

Table 6.2:  
Data collection process  
for PCB inventory

Types of Industry or/and Organization	Applications (equipment) Possibly Containing PCB
Landfills (including industrial and municipal waste disposal sites)	Decommissioned equipment, oil, etc.
Others (including production of food products, beverages and tobacco)	Transformers Small capacitors

Transformers are electromagnetic devices composed of two or more electrical circuits connected with a magnetic flux. Transformers are used for various purposes in almost all fields of electrical engineering; however, they are most commonly used as power transformers for increasing or decreasing the voltage and currents in electrical networks by the conversion of significant amounts of electric energy. The heat caused by losses in the windings and the iron core must be removed from the transformer. Liquid or gaseous agents are used for removing heat from large power transformers. For this purpose, the coils and the iron core are placed in a cauldron containing transformer oil (mineral oil, PCB oil etc.). The oil is used as a coolant due to its ability to remove and accumulate heat, and it also serves as an insulation material<sup>208</sup>.

Capacitors are devices composed of at least two conductive bodies (panels, foils, metallic foil) separated by dielectric which has the ability to accumulate electrical energy<sup>209</sup>.

High-voltage circuit breakers are devices that are used for installing electrical circuits, in other words: disconnecting electrical circuits, connecting and reconnecting electrical circuits, installation of transmission lines, transformers, cables, busbars, etc., and quite frequently (several times a day) installing capacitor banks and reactors, breaking short circuit currents in order to protect the equipment and the staff, etc.<sup>210</sup>. The issue of electric arc is formed with high voltage circuit breakers. They are divided as: oil, minimum oil, pneumatic, SF<sub>6</sub> (Sulphur-hexafluoride), air-blast, vacuum circuit breakers and others. In minimum oil breakers the oil is used only for the extinguishing of the arc (mineral oil, PCB oil and others), whereas in oil breakers, the oil is additionally used for insulation between the boiler and the intermediate isolation.

For the purposes of inventory development, the PCB Inventory Group created a questionnaire for the PCB Inventory listing, which is in conformance with the UNEP Guidelines for the Identification of PCBs and Materials Containing PCBs. The PCB Inventory Group sent the questionnaires to the industrial plants, organizations and/or institutions in the period June - August 2013. The questionnaire was created for collecting the following information:

- Information about industrial plants, companies, institutions and/or organizations, location and equipment,
- Information on waste containing PCBs and possible contaminated areas,
- Information related to equipment that potentially contains PCBs, such as transformers, capacitors, vacuum pumps, light bulbs, electric cables, etc.

The key institutions for the PCB inventory development are the three public companies in BiH dealing with manufacturing, distributing and delivering electrical energy. According to the submitted questionnaires, these companies possess electrical equipment in which PCBs may have been used.

Table 6.3:  
Organizational Scheme  
of public power  
companies in BiH

Subsidiary	Electricity generating and distributing Company		
	Public Company "Elektroprivreda BiH d.d." Sarajevo	Public Company "Elektroprivreda Hrvatske zajednice Herceg Bosne d.d." Mostar	Joint Holding Company "Elektroprivreda Republike Srpske a.d." Trebinje
Generation of electricity	TPP "Tuzla"	HPP "Jajce I"	HPP "Trebinje"
	TPP "Kakanj"	HPP "Jajce II"	HPP "Višegrad"
	HPP "Jablanica"	HPP "Rama" Prozor	HPP "Mrkonjić Grad"
	HPP "Grabovica"	HPP "Peć Mlini" Grude	Coal Mine and TPP "Gacko"
	HPP "Salakovac"	HPP "Mostarsko Blato" Mostar	Coal Mine and TPP "Ugljevik"
		HPP "Mostar" Mostar	
		PSPP "Čapljina" Čapljina	

208 Šemsudin Mašić. Električni strojevi, Sarajevo

209 Alija Džigal. Osnove elektrotehnike, Svjetlost, Sarajevo

210 Mirsad Kapetanović. Visokonaponski prekidači, Sarajevo, 2002

Electricity generating and distributing Company			
Subsidiary	Public Company "Elektroprivreda BiH d.d." Sarajevo	Public Company "Elektroprivreda Hrvatske zajednice Herceg Bosne d.d." Mostar	Joint Holding Company "Elektroprivreda Republike Srpske a.d." Trebinje
Distribution of electricity	"Elektrodistribucija" Sarajevo	Distribution subsidiary "Jug"	"Elektrokrajina" Banja Luka
	"Elektrodistribucija" Tuzla	Distribution subsidiary "Centar"	"Elektro Doboј" Doboј
	"Elektrodistribucija" Zenica	Distribution subsidiary "Sjever"	"Elektro Bijeljina" Bijeljina
	"Elektrodistribucija" Bihać		"Elektrodistribucija Pale" Pale
	"Elektrodistribucija" Mostar		"Elektrohercegovina" Trebinje

With the support of the Ministry of Foreign Trade and Economic Relations of BiH, the PCB Inventory Group held official meetings with the key industrial plants, companies, institutions and/or organizations assumed to possess adequate information.

Key institutions	Companies
Chamber of Commerce of BiH	Public Enterprise "Elektroprivreda Hrvatske zajednice Herceg Bosne d.d." Mostar
Agency for Statistics of BiH	Public Enterprise "Elektroprivreda BiH d.d." Sarajevo
Indirect Taxation Authority of BiH	Natron Hayat d.o.o. Maglaj
Federal Ministry of Environment and Tourism	"Elektrodistribucija" Zenica, 10/0,4 Tešanj 2
	Subsidiary Company Brown Coal Mine "Zenica" d.o.o.
	Subsidiary Company Brown Coal Mine "Breza" d.o.o.
	Subsidiary Company Brown Coal Mine "Đurđevik" d.o.o.
	Subsidiary Company Brown Coal Mine "Abid Lolić" d.o.o.
	Cantonal Hospital Goražde.

Table 6.4:  
Industries, companies,  
institutions and / or  
organizations with whom  
meetings were held

The Indirect Taxation Authority of BiH and the Agency for Statistics of BiH were identified as state institutions which are considered to possess information on import and export of PCBs, by using tariff codes.

Tariff code	Name
271091 00 00	Waste oils containing polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCTs) or polybrominated biphenyls (PBBs)
3824 97 00 00	Mixtures and preparations containing polybrominated biphenyls (PBBs), polychlorinated biphenyls (PCBs), polychlorinated terphenyls (PCT)
8532	Electrical capacitors, fixed, variable and adjustable
8504	Electrical transformers, static converters (for example, rectifiers) and reactance reels and other inductors - Liquid dielectric transformers
8504 21 00 00	-- power not exceeding 650 kVA
8504 22	-- power exceeding 650 kVA, but not exceeding 10 000 kVA
8504 23 00 00	-- power exceeding 10 000 kVA

Table 6.5:  
Tariff codes in BiH for  
goods that may contain  
PCBs

With the support of the Ministry of Foreign Trade and Economic Relations of BiH, the PCB Inventory Group organized, during the period from November 18 to November 27, 2014, visits to companies (Table 6. 1) and conducted equipment inspection and sampling of oil in transformers, capacitors and circuit breakers with the approval of the industrial plants, organizations and/or institutions. The industrial plants, organizations and/or institutions, visited by the PCB Inventory Group, were selected on the basis of the questionnaires in which the companies stated that they do have equipment containing PCBs. The PCB Inventory Group visited each company that reported owning equipment containing PCBs.

The field visit was organized by combining the needs of the preliminary inventory of PCBs in Bosnia and Herzegovina within this project and the needs of the MedPartnership Project (The Strategic Partnership for the Mediterranean Large Marine Ecosystem) which is co-implemented in Bosnia and Herzegovina (Table 6. 6), i.e. the Sub-component 2.3. "Environmentally sound management of equipment, stocks and wastes containing or

contaminated by PCBs in national electricity companies of Mediterranean countries (Albania, Bosnia and Herzegovina, Egypt and Turkey)" (2009 – 2013). The MedPartnership Project's Subcomponent 2.3. was developed by the Mediterranean Pollution Assessment and Control Programme ("MEDPOL") in collaboration with the Cleaner Production Regional Activity Centre ("CPRAC"). Within the framework of Sub-component 2.3, the PCB Inventory Group underwent training in management of polychlorinated biphenyls (PCBs) and practical training in taking samples and using PBC Dexil L2000 DX analyser.

*Table 6.6:  
Companies visited  
during the period 18–27  
November 2013*

Entity	Company	Date
FBiH	PSP "Čapljina" Čapljina	24/09/2013
	"Elektrodistribucija" Sarajevo	11/07/2013
	"Elektrodistribucija" Zenica, TS 35/10 kV Maglaj II	18/11/2013
	"Elektrodistribucija" Zenica, TS 110/35 kV Tešanj	19/11/2013
	"Elektrodistribucija" Zenica, 10/0,4 Tešanj 2	19/11/2013
	Pobjeda Tešanj d.o.o.	19/11/2013
	Enker d.o.o.	19/11/2013
	"Elektrodistribucija" Zenica, TS 35/(20)10 Jelah	19/11/2013
	"Elektrodistribucija" Zenica, TS 10/0.4 kV Vitex 4	20/11/2013
	"Elektrodistribucija" Zenica, TS 110/35/10 kV Visoko	20/11/2013
	Subsidiary Company Brown Coal Mine "Zenica" d.o.o.	21/11/2013
	Subsidiary Company Brown Coal Mine "Breza" d.o.o.	27/11/2013
	Subsidiary Company Brown Coal Mine "Đurđevik" d.o.o.	26/11/2013
	Kemokop d.o.o.	18/11/2013
	Kemis d.o.o.	18/11/2013
RS	Jelšingrad Livar	22/11/2013

During the field visits to the companies in the period 18 - 27November, 2013, the PCB Inventory Group conducted the following:

- Equipment inspection,
- Equipment inventory listing and records of the presence of PCBs in equipment,
- Labelling the listed equipment,
- Sampling.

The PCB Inventory Group performed equipment inspection based on the identification plates and available documentation of the manufacturer. The following were analysed, recorded and listed during the inspection:

- Equipment which contains PCBs according to the manufacturer's declaration,
- Equipment which contains no PCBs according to the manufacturer's declaration and other technical documentation,
- Equipment which has been subjected to cross contamination with PCBs (e.g. using tools contaminated with PCBs during overhauling).

By inspecting the equipment (capacitors), the PCB Inventory Group determined the presence of PCBs based on the manufacturer's declaration, since, according to the UNEP Guidelines for the Identification of PCBs and Materials Containing PCBs, equipment for which it is technically impracticable to examine the contents of PCBs<sup>211</sup>, and which has been labelled as contaminated with PCB according to the manufacturer's declaration, is considered to contain PCBs. All other equipment containing insulating fluids, for example oil, is suspected to contain PCB until it is proven otherwise by analytical methods, because the presence of PCBs in equipment may occur during exploitation, in other words, by secondary contamination when coming into contact with oil: reconstitution, replacement, processing, sampling of oil, repairs, inspections, overhauls, etc.

<sup>211</sup> Condensers are closed systems in which it is technically impracticable to examine the contents of PCB and therefore no sampling is performed on condensers. The presence of PCB in condensers is determined by equipment inspection based on the manufacturer's declaration indicating that they contain PCBs.



Regardless of the quantity, the presence of PCBs can cause secondary contamination as shown in the table below, which demonstrates that less than one cup (approximately 200 ml) of pure piralen<sup>212</sup> is sufficient for the secondary contamination of a single distribution transformer 35/10 kV (Table 6. 7).

Type of transformer	Voltage kV	Power MVA	Oil quantity kg	PCB content ppm <sup>214</sup>	PCB quantity in g	PCB quantity in ml
Industrial	6/0.4	1.25	600	50	30	22
Distributive	35/10	1.6	2,000	50	100	72
Distributive	35/10	8	4,800	50	240	172
Industrial	110/6.3	20	13,600	50	680	486

Table 6.7:  
Examples of required amounts of PCB contamination transformer

The equipment which was listed and sampled during field visits was labelled (Figure 6. 2).

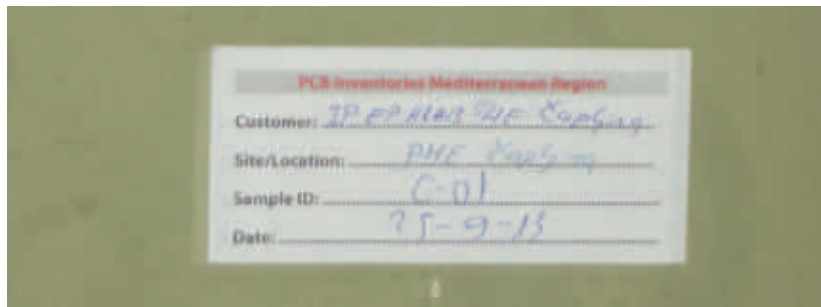


Figure 6.2:  
Labelling of equipment

The PCB Inventory Group also conducted sampling during the field visits. The sampled equipment was selected based on the following:

- The submitted questionnaire in which the owners of the equipment expressed their suspicions about the presence of PCBs in equipment,
- In accordance with the Guidelines, only equipment containing more than 5 dm<sup>3</sup> (5 l) of oil was sampled,
- Availability of equipment i.e. samples were taken only from the equipment that was out of service at the time (in “stand-by” mode).

Entity	Company	Samples taken from:				
		Transformers	Capacitors	Circuit breakers	Barrels	Soil
FBiH	PSP “Čapljina”	2 <sup>215</sup>				
	“Elektrodistribucija” Zenica, TS 35/(20)10 Jelah		2			2
	Subsidiary Company Brown Coal Mine “Zenica”	2				
	Subsidiary Company Brown Coal Mine “Breza”	1	1	1	1	
	Subsidiary Company Brown Coal Mine “Đurđevik”	3				
RS	Jelšingrad Livar	2				
BiH		10	3	1	1	2

Table 6.8:  
Companies and equipment from which the sample was taken

After visiting the aforementioned companies and conducting inspections, listing, detecting the presence of PCBs in equipment, labelling and sampling, the PCB Inventory Group performed:

- Analysis of collected data,
- Analysis of samples.

212 Piralen is the commercial name for the PCB based transformer oil which was produced by the company Monsanto and used widely throughout Europe.

213 S.Teslić, J.Janković, B.Bošković, V.Radin, J.Lukić, S.Milosavljević: Mineralna transformatorska ulja kontaminirana piralenom (PCB) – od identifikacije do rešavanja problema, Elektrotehnički Institut „Nikola Tesla“, Srbija

214 The unit ppm (parts per million) is used to express concentration in the relative proportions and the nondimensional size. Concentration in ppm expressed as: 1 ppm = 1 mg / ml.

215 2 samples from a single transformer

During the oil analysis three basic methods for the detection of PCBs are currently used <sup>c216</sup>:

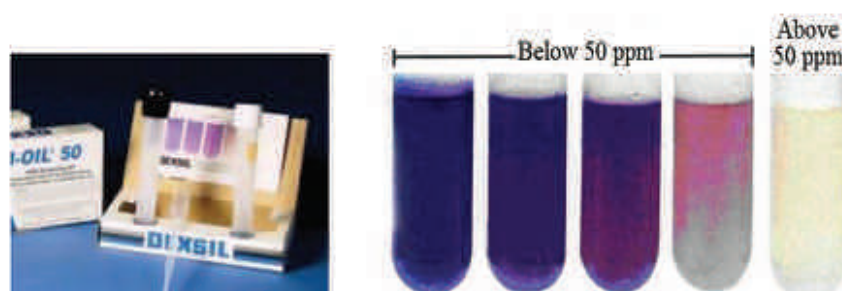
- chemical colorimetric test kits used for detecting the presence of PCBs in the examined sample by determining the range of concentration (0 - 50 ppm; 50 - 500 ppm; > 500 ppm),
- electrochemical method which provides a quantitative result of the total concentration of chlorine with the help of which it is possible to calculate the amount of PCBs present;
- instrumental method based on gas chromatographic (GC) analysis which enables accurate determination of concentrations of individual isomers (compounds of the same basic structure - polychlorinated biphenyls with different number and arrangement of chlorine atoms), as well as the total concentration of PCBs in insulating fluid.

Concentration ranges are given in the Stockholm Convention:

- Equipment containing more than 50 ppm PCBs is treated as contaminated equipment,
- Equipment contaminated in the range 50 to 500 ppm can be used if it is properly identified and labelled, and if it is valid and not leaking and if the oil is replaced with one that does not contain PCBs.
- Equipment contaminated with PCBs in a range above 500ppm should be removed.

The colorimetric method is the simplest and least costly technique for determining the total chlorine content (Figure 6. 3). Organic chlorine compounds are extracted from the analysed oil sample, and their total concentration is determined by colorimetric reaction (colour change reaction). Advantages of the colorimetric method are that it is fast, cheap, simple, applicable on the site, and it provides a reliable result.

*Figure 6.3:  
Colorimetric method for  
determining PCB content  
with test kits*



Just like the colorimetric method, the electrochemical method also involves extraction of chlorine compounds from oil or land samples. Instead of a colorimetric reagent, ion-specific electrode is used for the quantitative measurement of the concentration of chloride ions in the oil sample which is converted to an equivalent concentration by using the conversion factor<sup>217</sup> PCB which is integrated in the instrument (Dexil L2000 DX Chloride Analyser - Figure 6. 4). Advantages of the electrochemical method are speed, low cost analysis, possibility of quantitative determination of chlorine.

*Figure 6.4:  
Electrochemical methods  
for determining PCB  
content with ion-specific  
electrode*



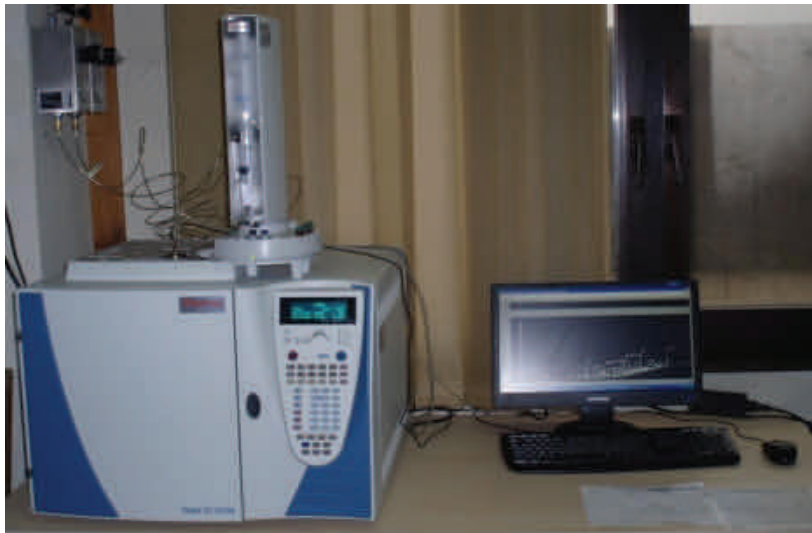
216 S.Teslić, J.Janković, B.Bošković, V.Radin, J.Lukić, S.Milosavljević: Mineral transformer oil contaminated with pirlalen (PCB) – from identification to problem solving, Institute of Electrical Engineering “Nikola Tesla”, Serbia

217 S.Teslić, J.Janković, B.Bošković, V.Radin, J.Lukić, S.Milosavljević: Mineral transformer oil contaminated with pirlalen (PCB) – from identification to problem solving, Institute of Electrical Engineering “Nikola Tesla”, Serbia

Basic limitations of this method are:

- major impact of chlorine compounds that may not be PCBs - for example in areas near salt water due to the presence of NaCl,
- may give increased results of the present PCB content and
- insufficiently precise calibration for single point (50 ppm).

Quantitative analysis (GCECD or GCMS technique) is based on the quantitative determination of the total amount of PCBs by gas chromatography using a capillary column, with high resolution electron capture detector (ECD detector) or mass detector (MS detector). Both detectors are very sensitive to halogen elements (chlorine, bromine) and therefore provide a low detection limit of PCB congeners (Figure 6. 5).



*Figure 6.5:  
Gas chromatography  
with EC detector*

High resolution of gas chromatography and high sensitivity of the detectors provide an opportunity not only for the identification of Aroclor (mostly commercial mixture PCB) or Aroclor compositions (A) present in the sample but also the quantification of individual PCB isomers. According to the Decision of the European Commission (Commission Decision 2001/68/EC), European standard IEC 61619/EN 12766 is applied as the reference method for determining PCB content in insulating liquids. The method is applicable for unused, regenerated oils as well as used and contaminated insulating liquids<sup>219</sup>.

Advantages of quantitative analysis are:

- most suitable method for determining the PCB content in mineral oils,
- high resolution GC for separating PCBs from other components in the mixture,
- sophisticated system which allows for a relatively easy identification of Aroclor present in oil
- quantitative analysis.

Limitations of this method are:

- analysis takes a relatively long time (about 60 minutes)
- cost is relatively high compared to qualitative techniques.

The first two methods are methods for determining the presence of chlorine in the insulating oil and represent qualitative techniques (electrochemical also gives the concentration of chlorine), whereas the third method determines the presence and concentration of PCB compounds (quantitative technique). Due to the large number of potentially contaminated equipment, applying only the quantitative technique as the most reliable technique would be impractical because of the high cost of the analysed sample and the long duration of the

218 S. Teslić, J. Janković, B. Bošković, V. Radin, J. Lukić, S. Milosavljević: Mineral transformer oil contaminated with pirlen (PCB) – from identification to problem solving, Institute of Electrical Engineering “Nikola Tesla”, Serbia

219 S. Teslić, J. Janković, B. Bošković, V. Radin, J. Lukić, S. Milosavljević: Mineral transformer oil contaminated with pirlen (PCB) – from identification to problem solving, Institute of Electrical Engineering „Nikola Tesla“, Serbia

analysis. With the aim of accomplishing the fastest and most economical characterization of oil in electrical equipment in terms of determining PCBs in equipment, the PCB Inventory Group used the following approach:

- Samples of insulating oils were primarily examined by qualitative methods (test kits and/or electrochemical analyzer Dexsil L2000 DX),
- Samples which showed negative results were labelled as not contaminated with PCBs (below 50 ppm),
- Samples which showed positive results were labelled as “containing PCB”, but need to be analysed and verified by quantitative techniques, with the aim of measuring the exact concentration of PCBs.

### 3. Process of PBDEs and PFOS inventory

The PBDEs/PFOS Inventory Work Group used the methodology for the inventory of PBDEs and PFOS, developed by UNEP:

- Guidance for the inventory of polybrominated diphenyl ethers (PBDEs) listed under the Stockholm Convention on Persistent Organic Pollutants, UNEP 2012 and
- Guidance for the inventory of perfluorooctane sulfonic acid (PFOS) and related chemicals listed under the Stockholm Convention on Persistent Organic Pollutants, UNEP 2012

In accordance with the guidance, the PBDEs/PFOS Inventory Group used the list of interest groups that may have information relevant to the inventory of PBDEs and PFOS (Table 6. 9), i.e. as a source of information during the identification of relevant key industrial sectors and interest groups involved in the production and/or use of materials containing PBDEs and PFOS.

*Table 6.9:  
Sectors and stakeholders  
involved in the  
production and use of  
POP-PBDEs and PFOS  
relevant for the inventory*

Sectors relevant to the POP-PBDEs and PFOS Inventory	Stakeholders
Electrical and electronic equipment (EEE) and waste electrical and electronic equipment (WEEE)	NIP coordinator and steering committee Indirect Taxation Authority Agency for statistics Importers and exporters of electronics Retailers of electronics and second-hand electronics Recyclers of WEEE Other relevant stakeholders in the country
Transportation and end-of-life vehicles	Indirect Taxation Authority Agency for statistics Agency for Identification Documents, Registers and Data Exchange Ministry of Communications and Transport BiH Federal Ministry of Transport and Communications Ministry of Transport and Communications RS Other relevant stakeholders in the country
Fire fighting foams	Indirect Taxation Authority Professional users: <ul style="list-style-type: none"> <li>▪ Petrochemical, chemical plants and other relevant industry</li> <li>▪ Airports</li> <li>▪ Fire and rescue brigades</li> <li>▪ Fire fighting training sites</li> </ul>
Textiles and upholstery	Indirect Taxation Authority Agency for statistics Larger manufacturers and suppliers of textile formulas and their associations Larger manufacturers in the textile impregnation industry and their associations Larger manufacturers of textiles, apparels, home furnishing and upholstery, and their associations Larger retailers of textiles, apparels, home furnishing and upholstery
Leather and apparel	Larger manufacturers and suppliers of leather formulas and their associations Larger manufacturers in the leather impregnation industry and their associations Larger manufacturers of leather articles and apparel, home furnishing and upholstery and their associations Larger retailers of leather articles, apparel, home furnishing and upholstery
Industrial and household treatment products Shampoos Cleaning agents, Cosmetics and hand cream	Indirect Taxation Authority Agency for statistics Manufacturers and suppliers of chemical formulas, and their associations Larger manufacturers and suppliers of cleaning products, surface treatments, paint, printing ink, adhesives and sealants, and their associations

In order to identify and contact the interest groups so as to collect data, the PBDEs/PFOS Inventory Group used the following:

- Postal services,
- E-mail/ Web-based sources of information,
- Head to head interviews,
- Phone interviews,
- Telephone directories,
- National registries.

The PBDEs/PFOS Inventory Group used the UNIDO questionnaires and sent them to the identified interest groups. The questionnaires, along with the information requested, were sent via fax or e-mail, to representatives of key industry sectors and interest groups involved in the production and / or use of materials containing PBDEs and PFOS during the period from June to November 2013.

Chemicals	Questionnaire	Topics
POP-PBDEs	Questionnaire for households (EEE)	<ul style="list-style-type: none"> <li>▪ Amount of electrical and electronic equipment imported and sold in the country</li> <li>▪ Number of electrical and electronic equipment in use in households and institutions/companies</li> <li>▪ Life span of electrical and electronic equipment in households and institutions/companies</li> <li>▪ General awareness level on e-waste issues</li> <li>▪ End of life management of electrical and electronic equipment</li> </ul>
	Questionnaire for EEE importers	
	Questionnaire for corporate and institutional consumers	
	Questionnaire for WEEE recyclers	
PFOS <sup>220</sup>	Questionnaire for fire fighting foams	<ul style="list-style-type: none"> <li>▪ Data on currently used fire fighting foams</li> <li>▪ Data on usage frequency, location and amount of fire fighting foam use for training purpose</li> <li>▪ Data on location and amount of fire fighting foam used in actual fire events (for the past 20 years)</li> <li>▪ Management of waste generated from application of fire fighting foam</li> <li>▪ Data on investigation of training site/site of accidental fires</li> <li>▪ Data on type and amounts of textile the company deals with, as well as on used chemicals</li> <li>▪ Waste management data</li> </ul>
	Questionnaire for textile manufacturers and retailers	
	Questionnaire for waste treatment facilities	

*Table 6.10: Questionnaires for the POP-PBDE and PFOS inventory and addressed topics*

In the period from June to December 2013, the PBDEs/PFOS Inventory Group collected the existing documentation and statistical data on materials containing PBDEs and PFOS from institutions, organizations and the Internet (Table 6. 13), which could be obtained on the territory of BiH. These reports and publications, databases and national statistics were the source of information the PBDEs/PFOS Inventory Group benefited from during the process of the inventory.

The PBDEs/PFOS Inventory Group collected the data and contacted the institutions, organizations and companies shown in Table 6. 11

Contacted institutions / organizations / companies	Contact period	Type of contact	Expected data
<ul style="list-style-type: none"> <li>▪ Cantonal Administrations of Civil Protection;</li> <li>▪ ZEOS Eko-sustav d.o.o.<sup>221</sup>;</li> <li>▪ Indirect Taxation Authority of BiH; and</li> <li>▪ Chamber of Economy of the Federation of Bosnia and Herzegovina.</li> </ul>	June – October 2013	By telephone and officially by sending a request for access to information	Data on institutions / organizations / companies that use, trade and / or dispose of materials containing POP-PBDEs and PFOS

*Table 6.11: Overview of institutions / organizations / companies that the PBDEs / PFOS Inventory Group contacted in the period June - November 2013*

<sup>220</sup> Stakeholders, who received the questionnaires from the PBDEs/PFOS Inventory Work Group, were also familiar with the fact that in addition to PFOS there is a large number of PFOS-related substances and all are regulated by the Stockholm Convention. There are several references listing PFOS-related substances, one of which is the most comprehensive list compiled by the Organization for the Economic Cooperation and Development (OECD, 2007), and it forms an integral part of the questionnaire. The list is applied in order to ensure that the inventory of fire-fighting foam provides the desired results of the relevant national usage.

<sup>221</sup> ZEOS Eko-sustav d.o.o. is the authorized operator for the management of waste electrical and electronic equipment in the Federation of Bosnia and Herzegovina

Contacted institutions / organizations / companies	Contact period	Type of contact	Expected data
<ul style="list-style-type: none"> <li>▪ Ministry of Foreign Trade and Economic Relations of BiH;</li> <li>▪ Foreign Trade Chamber of BiH; and</li> <li>▪ Agency for Statistics of BiH</li> </ul>	May – November 2013	By telephone, meetings and officially by sending a request for access to information	Data on institutions / organizations / companies that use, trade and / or dispose of materials containing POP-PBDEs and PFOS, such as: electrical and electronic equipment, vehicles (cars, buses and trucks), firefighting foams, products on the consumer market, textiles, synthetic carpets, etc.
Institutional and corporate users of EEE	July 2013	Questionnaire	Data on different economic sectors with different consumer habits and behavior (ICT, administration, banking, education, health sector, etc.).
Manufacturers and importers of EEE	July 2013	Questionnaire	Imported and sold EEE in BiH
Households in rural and urban areas throughout BiH (FBiH, RS and BD) and between different categories of income	November 2013.	Survey	Data on consumer habits related to EEE at consumer level
Agency for identification documents, registers and data exchange of BiH	June 2013.	Access to web-base	Data on the number of registered vehicles and vehicles that have reached the end of life cycle (ELV)
Agency for Statistics of BiH	June 2013	Access to web-base	Data on quantities of textiles, carpets and consumer products manufactured and sold
Manufacturers of textile, clothing and footwear, home furnishing materials and upholstery, and their associations	June 2013	Questionnaire	Data on handling of materials containing PFOS
Civil Protection Administrations and professional users of fire fighting foams	June – August 2013	Questionnaire	Data on the use of fire fighting foam
Municipal landfill operators	June – August 2013	Questionnaire	Data on the disposal of materials containing PBDEs and PFOS

An overview of the number of questionnaires per entities and substances through which the PBDEs/PFOS Inventory Group sought information about PBDEs and PFOS from institutions/ organizations/companies is presented in Table 6. 12.

*Table 6.12:  
Number of questionnaires that the PBDEs / PFOS Inventory Group sent to institutions/ organizations/companies in BiH during the inventory of PBDEs / PFOS in the period June - September 2013*

Entity/Substance	PBDEs	PFOS	Total PBDEs+PFOS
FBiH (including BD)	217	195	412
RS	200	169	369
<b>Total BiH</b>	<b>417</b>	<b>364</b>	<b>781</b>

Table 6. 13 shows the process of collecting data that was used for the PBDEs/PFOS Inventory by the Group.

*Table 6.13:  
Data collection process for PBDE/PFOS inventory*

Source of Data	Type of Data	Documentation Analyzed	Obtained Data
Competent ministries at entity and/or state level	Official reports regarding environmental permits, waste management plans, etc.	<ul style="list-style-type: none"> <li>▪ Federal Ministry of Environment and Tourism: Federal waste management plan 2012 – 2017, December 2011</li> <li>▪ Federal Ministry of Environment and Tourism: Obtained environmental permits in FBiH 2004 - 2012</li> </ul>	<ul style="list-style-type: none"> <li>▪ Estimated yearly average quantity of WEEE</li> <li>▪ List of active facilities for wastewater treatment from households and industrial facilities</li> <li>▪ List of facilities for wastewater treatment which possess environmental permits</li> <li>▪ List of waste management companies which possess environmental permits</li> <li>▪ List of companies from chemical sector which possess environmental permits</li> </ul>

Source of Data	Type of Data	Documentation Analyzed	Obtained Data
Governmental state and entity institutions	Lists of active industries, manufacturers, commercial businesses	<ul style="list-style-type: none"> <li>Foreign Trade Chamber of BiH: Wood Industry Bosnia and Herzegovina – Company Directory, Sarajevo, unknown year</li> <li>Foreign Trade Chamber of BiH: Textile, Clothing, Leather, Footwear – Catalogue, Sarajevo, unknown year</li> <li>Chamber of Economy of the BiH: List of manufacturers of EEE, excel sheet</li> <li>Chamber of Economy of the BiH: Wood industry - List of manufacturers of furniture, excel sheet</li> </ul>	<ul style="list-style-type: none"> <li>List of manufacturers from textile, clothing, footwear and leather sectors</li> <li>List of manufacturers of EEE</li> <li>List of manufacturers of furniture</li> </ul>
State and entity offices of statistics	Statistical data on industrial production, transport, waste, wages, etc.	<ul style="list-style-type: none"> <li>Agency for Statistics of BiH, Environment, Energy, Transport 2012, March 2013</li> <li>Agency for Statistics of BiH, Environment, Energy, Transport 2011, December 2011</li> <li>Industrial production PRODCOM results in Bosnia and Herzegovina for year 2012, Agency for Statistics BiH, July 2013</li> <li>Agency for Statistics of BiH, Foreign Trade 2012, 2013</li> <li>Federal Office of Statistics, Statistical Yearbook 2012</li> <li>Agency for Statistics of BiH, Household Budget Survey 2011</li> <li>Agency for Statistics of BiH, Waste from production activities 2010, first release, April 2012</li> <li>Federal Office of Statistics, Waste from production activities in 2010, first release, October 2011</li> <li>Agency for identification documents, registers and data exchange: Motor vehicles records - First time registered vehicles, 2012</li> <li>Agency for identification documents, registers and data exchange: Motor vehicles records - First time registered vehicles, 2011</li> <li>Agency for identification documents, registers and data exchange: Motor vehicles records - All registered vehicles, 2012</li> <li>Agency for identification documents, registers and data exchange: Motor vehicles records - All registered vehicles, 2011</li> </ul>	<ul style="list-style-type: none"> <li>Average age of vehicles</li> <li>Quantity of soap and detergents, cleaning and polishing products, perfumes and toilet products produced in 2012</li> <li>Quantity of soap and detergents, cleaning and polishing products, perfumes and toilet products sold in 2012</li> <li>Quantity of textile produced in 2012</li> <li>Quantity of textile sold in 2012</li> <li>Quantity of carpets and rugs produced in 2012</li> <li>Quantity of carpets and rugs sold in 2012</li> <li>Import and export of EEE in BAM from 2003 until 2012</li> <li>Percentages of persons employed according to amount of net wages in 2012</li> <li>Estimated number and percentage of households in the Household Budget Survey in BiH, by settlement type (urban and rural/semi-urban), in 2011</li> <li>Amounts of total and hazardous waste (EEE) generated in production activities in 2010</li> <li>Number of first time registered vehicles (cars, buses and trucks) in 2011 and 2012</li> <li>Number of all registered vehicles (cars, buses and trucks) in 2011 and 2012</li> </ul>
General data web-mining	Data on various subjects identified in the previous steps (activities, contacts, etc.)	<ul style="list-style-type: none"> <li><a href="http://www.fmoit.gov.ba/download/IZVJE%C5%A0_E%20%20%20%20PREKOGGRANL_NOM%20%20IZVOZU%20%20OPASNOG%20%20OTPAD%20%20OD%20%20STRANE%20%20OVLA%C5%A0TENIH%20%20TVRTKI,%20PREMA%20%20KOLI_INAMA%20%20%20%20VRSTAMA%20%20OTPAD,%20za%202010.,%202011.,%20i%202012.%20godinu%20(BASELSKA%20KONVENCIJA).pdf">http://www.fmoit.gov.ba/download/IZVJE%C5%A0_E%20%20%20%20PREKOGGRANL_NOM%20%20IZVOZU%20%20OPASNOG%20%20OTPAD%20%20OD%20%20STRANE%20%20OVLA%C5%A0TENIH%20%20TVRTKI,%20PREMA%20%20KOLI_INAMA%20%20%20%20VRSTAMA%20%20OTPAD,%20za%202010.,%202011.,%20i%202012.%20godinu%20(BASELSKA%20KONVENCIJA).pdf</a></li> <li><a href="http://www.fmoit.gov.ba/download/Spisak%20firmi.pdf">http://www.fmoit.gov.ba/download/Spisak%20firmi.pdf</a></li> <li><a href="http://www.fucz.gov.ba/fucz/bosanski/sekretar/index.php">http://www.fucz.gov.ba/fucz/bosanski/sekretar/index.php</a></li> <li><a href="http://www.utok.ba/">http://www.utok.ba/</a></li> <li><a href="http://www.komorars.ba/pkrs/">http://www.komorars.ba/pkrs/</a></li> <li><a href="http://www.esrpska.com/search.aspx?s=%u0412%u0430%u0442%u0440%u043E%u0433%u0430%u0441%u0446%u0438%20&amp;t=inst&amp;hs=1">http://www.esrpska.com/search.aspx?s=%u0412%u0430%u0442%u0440%u043E%u0433%u0430%u0441%u0446%u0438%20&amp;t=inst&amp;hs=1</a></li> <li><a href="http://www.business-rs.ba/PrivredniSubjekti.aspx">http://www.business-rs.ba/PrivredniSubjekti.aspx</a></li> </ul>	<ul style="list-style-type: none"> <li>WEEE exported quantity in 2011 (Basel Convention)</li> <li>List of companies in BiH dealing with disposal and export of hazardous wastes according to provisions of Basel Convention</li> <li>List of manufacturers from textile, clothing, footwear and leather sectors</li> <li>List of Administrations of Civil Protection</li> <li>List of manufacturers of EEE</li> <li>List of corporate and institutional companies</li> </ul>
Specific subjects identified in the previous steps	Data on quantities of PBDEs and PFOS containing materials (via questionnaires)	<ul style="list-style-type: none"> <li>Questionnaires and official letters</li> </ul>	<ul style="list-style-type: none"> <li>See Table 6. 10</li> </ul>

#### 4. Process of PCDD / PCDF inventory

The PCDD/PCDF Inventory Group used the UNEP Chemicals methodology specified in the guidelines “*Toolkit for Identification and Quantification of Releases of Dioxin and Furan and other Unintentional POPs*” (UNEP 2013).

The UNEP methodology suggests five basic steps in the process of developing the dioxin and furan inventory:

- Identification of the main source groups of PCDD/PCDF;
- Identification of categories, current activities and potential release routes of PCDD/PCDF in the environment;
- Collecting data on specific processes defined in the UNEP Toolkit (2013), such as potential sources of PCDD/PCDF;
- Quantification of sources of PCDD/PCDF, calculation of emissions with the help of emission factors specified in the UNEP Toolkit (2013);
- Cumulative results of the inventory.

This methodology characterizes the main PCDD/PCDF sources into 10 main categories<sup>222</sup> in accordance with which the inventory was developed. The PCDD/PCDF Inventory Group used a “top-down” approach for collecting data, i.e. collecting data on the extent of the processes identified as potential sources in the country, and subsequently contacting a specific industry/subject by sending questionnaires, making phone calls or arranging meetings.

The PCDD/PCDF Inventory Group has adapted the questionnaires provided in the UNEP Toolkit (2013) for each specific category, in order to obtain the necessary data from the manufacturing processes and emissions of the identified categories of PCDD/PCDF sources.

**A total of seven types of questionnaires have been adapted**, with respect to the source groups:

- waste incineration,
- metal production,
- heat and power generation,
- production of mineral products,
- transportation,
- open burning processes,
- production and use of chemicals and consumer goods.

These questionnaires were sent via fax or e-mail to individual institutions, organizations and companies in FBiH, RS and BD. Out of a total number of 417 questionnaires distributed to institutions, organizations and/or companies, 81 were completed and/or partially completed.

In order to make up for lack of data, the PCDD/PCDF Inventory Group used the information related to industry and other economic entities, that is available on the official website of the Federal Ministry of Environment and Tourism (FMOIT), in form of action plans and waste management plans. These action plans are part of the **process of issuing environmental permits** pursuant to Environmental Protection Act (“Official Gazette of the Federation of BiH”, no: 33/03, 38/09) which orders that the industry and other economic entities must develop an **Action Plan with measures and deadlines for the gradual reduction of emissions, in compliance with the best available technology, with the aim of obtaining environmental permits**. These action plans contain information about the respective industry, including the production process and technology, and environmental impacts (e.g. emissions into water, air and soil, etc.). The available data from environmental permits have also been used for the industry on the territory of Republika Srpska.

#### **Identification of the main source groups and categories of PCDD/PCDF and potential release routes of PCDD/PCDF**

The main sources of PCDD/PCDF have been determined by the categorization of the UNEP methodology. The source categories are specified in the methodology which consists of **ten source groups**:

- Waste incineration
- Ferrous and non-ferrous metal production

<sup>222</sup> Check out the web page [http://toolkit.pops.int/Publish/Popups/07\\_Table1.html](http://toolkit.pops.int/Publish/Popups/07_Table1.html)



- Heat and power generation
- Production of mineral products
- Transport
- Open burning processes
- Production and use of chemicals and consumer goods
- Miscellaneous
- Waste treatment/disposal
- Identification of potential hot spots

#### **Collecting data on specific processes**

The information on the quantities of products produced in a specific country, during a specific period, as well as the manufacturing processes in which the product is formed, is very important for the assessment of dioxin and furan emissions into the environment. Dioxin and furan emissions of the same category can vary significantly depending on the applied technology, process performance and in most cases it is only possible to evaluate the scale of emission.

The PCDD/PCDF Inventory Group has obtained data on emissions into all segments of the environment from several sources:

- Tools for the identification and quantification of dioxin, furan emissions and other unintentional releases of POPs, according to Article 5 of the Stockholm Convention, January 2013;
- Progress report on implementation of consulting services for the development of the study "Integrated Forest Protection Program", Federal Ministry of Agriculture, Water Management and Forestry;
- List of waste incinerators of the Ministry of Trade, Tourism and Environmental Protection of Hercegovačko-neretvanski Canton;
- List of issued licenses for waste management, Ministry of Environmental Protection, Physical Planning and Construction of Zapadnohercegovački Canton;
- List of waste incinerators, Ministry of Environmental Protection, Physical Planning and Construction, Returnees and Residential Affairs of Srednjobosanski Canton;
- Report on cross-border exports of hazardous waste by authorized companies, according to the quantities and types of waste, for 2010, 2011 and 2012 (based on the Basel Convention), Federal Ministry of Environment and Tourism;
- Information on fires on the territory of Federation of Bosnia and Herzegovina, Federal Department of Civil Protection, September 2012;
- Registered motor vehicles for the year 2012, Agency for Statistics of Bosnia and Herzegovina, April 2013;
- Industrial products PRODCOM results, statistical bulletin no. 16 for 2012, Republic Institute of Statistics of Republika Srpska;
- Industrial products PRODCOM results in Bosnia and Herzegovina for 2012, Agency for Statistics of BiH;
- Agency for Statistics of BiH, Press Release, Production and Sales of Forest Assortments in Bosnia and Herzegovina according to the range of 2012;
- Agency for Statistics of BiH, Press Release, Short-term indicators of energy statistics in 2012, March 2012, first results;
- Agency for Statistics of BiH, Press Release, Short-term indicators of energy statistics, March, June 2012, first results;
- Agency for Statistics of BiH, Press Release, Short-term indicators of energy statistics in 2012, September 2012, first results;
- Information on fires on the territory of Federation of Bosnia and Herzegovina, Federal Department of Civil Protection, September 2012;
- Agency for Statistics of BiH, Press Release, Short-term indicators of energy statistics in 2012, December 2012, first results;
- Bosnia and Herzegovina the State Electricity Regulatory Commission, Report on the energy sector of Bosnia and Herzegovina for 2009;

- Federal Institute of Statistics, Press Release no. 5.5.1 from March 29, 2013: "Registered motor vehicles for the year 2012";
- Federal Institute of Statistics, Press Release no. 20.5.1. from August 1, 2013: "Collected and Disposed Municipal waste in 2012";
- Federal Institute of Statistics, Press Release no. 20.2.1. from July 1, 2013: "Purification and discharge of wastewater in 2012";
- Federal Institute of Statistics, Press Release no. 20.3.2. from September 9, 2013: "Utilization and protection of water against pollution in industry in 2012";
- Agency for Statistics of BiH, Press Release no. 1 from September 30, 2013: "Utilization and protection of water against pollution in industry in 2012";
- Republic Institute of Statistics RS, Annual Press Release no. 217/13 from September 2, 2013: "Public sewage system";
- Republic Institute of Statistics RS, Annual Press Release no. 215/13 from September 2, 2013: "Utilization and protection of water against pollution in industry";
- Republic Institute of Statistics RS, Annual Press Release no. 218/13 from September 2, 2013: "Produced, Collected and Disposed Waste ";
- Republic Institute of Statistics RS, bulletin no. 9 "Internal trade";
- Republic Institute of Statistics RS, bulletin no. 6 "Transport and communications";
- Republic Institute of Statistics RS, bulletin no. 13 "Forestry";
- Bosnia and Herzegovina Automobile Club, Information on the total number of new motor vehicles that were registered and sold in Bosnia and Herzegovina in the period January - December 2012;
- Federal Institute of Statistics FBiH, statistical bulletin 191, Industrial production FBiH 2012;
- Federal Institute of Statistics FBiH, monthly statistical review FBiH, no. 2, Sarajevo, February 2013;
- Agency for Identification Documents, Registers and Data Exchange -CIPS of registered vehicles: [www.iddeea.gov.ba](http://www.iddeea.gov.ba).
- Questionnaires sent via fax, mail and e-mail to multiple addresses;
- Bibliographic data on unit conversion:
  - [http://info.grad.hr/res/gf\\_osoblje/1033378314/doc/300.svojsva\\_drva.pdf](http://info.grad.hr/res/gf_osoblje/1033378314/doc/300.svojsva_drva.pdf);
  - [http://www.videncenter.dk/Groenne%20trae%20haefte/Groen\\_Engelsk/Kap\\_16.pdf](http://www.videncenter.dk/Groenne%20trae%20haefte/Groen_Engelsk/Kap_16.pdf);
  - <http://www.fao.org/docrep/x2740e/x2740e60.pdf>;
  - <http://npd.no/Global/Engelsk/3-Publications/Resource-report/Resource-report-2009/Coverion-tables.pdf>.

#### Quantification of PCDD/PCDF, calculation of emissions with the help of emission factors

For the source class of dioxins and furans, the PCDD/PCDF Inventory Group has, in accordance with the UNEP Toolkit (2013), calculated the amount of PCDD/PCDF releases into the environment in Bosnia and Herzegovina based on the equations below. The emission rate is multiplied by the emission factors. There are five emission factors and their sum relates the emission values for dioxins and furans per annum.

$$\begin{aligned}
 \text{PCDD/PCDF released, grams TEQ/year} = & + \text{Emission rate} \times \text{Emission factor}_{\text{air}} \\
 & + \text{Emission rate} \times \text{Emission factor}_{\text{water}} \\
 & + \text{Emission rate} \times \text{Emission factor}_{\text{land}} \\
 & + \text{Emission rate} \times \text{Emission factor}_{\text{products}} \\
 & + \text{Emission rate} \times \text{Emission factor}_{\text{residue}}
 \end{aligned}$$

TEQ-toxic equivalent

For the source category, annual emissions are calculated as the sum of the total annual emissions for each class within the categories. For each source group, the annual emission of PCDD/PCDF is the sum of the calculated annual emissions for each source category in the source group. For countries or regions, the total annual emission of PCDD/PCDF is the sum of annual emissions from all source groups.

### Cumulative results of the inventory of dioxins and furans

After the completion of the aforementioned steps to the inventory of dioxins and furans, the PCDD/PCDF Inventory has conducted a summary assessment of the annual emissions of dioxins and furans. Annual emissions of certain categories are summed up so as to obtain the emission per potential release routes of dioxins and furans in the environment, for all specified source categories of dioxins and furans.

#### 5. Process of analysis of the existing programs for monitoring emissions and impact on the environment and human health

During the development of the inventory and assessment of the capacity for monitoring, the Environment, Health, Research and Development Group acted according to the following algorithm:

1. Overview of laws and bylaws in BiH, FBiH, RS and BD related to environmental issues, air, surface and ground water, soil, food and drinking water, biome, and waste and waste management, in order to identify the relevant normative acts and obligations derived therefrom, as well as the institutions that are authorized by these laws, i.e. responsible for their implementation. Due to the complex state structure of BiH and the divided jurisdiction and responsibilities, it was necessary to do this for the normative acts and institutions at the state, entity and BD levels;
2. After identifying the institutions responsible for carrying out certain types of monitoring (Table 145), the Environment, Health, Research and Development Group conducted the analysis of available information on the results of the implemented examination. The results were obtained in the following manner:
  - a. Reviewing the information available on the official websites of competent institutions;
  - b. Reviewing the publicly available reports from the jurisdiction of the aforementioned institutions (e.g. The Statistical Yearbook, Report on Health Status of Population published by Entity Institute/Public Health Institute);
  - c. Based on the written reports of the competent institutions which were submitted as a response to the direct questions addressed to them. The inquiries were sent to the addresses of all the institutions identified in Item 1;
3. The Environment, Health, Research and Development Group has carried out the analysis of POPs monitoring in two ways:
  - e. Institutional, through competent institutions which are specified in the relevant laws and bylaws, i.e. laboratories approved by the competent institutions for such monitoring. The inventory of institutional capacity was carried out through:
    - i. Reviewing the reports referred to in item 2;
    - ii. Reviewing the list of laboratories which are authorized to carry out monitoring. The list is publicly available on the official websites of the state institutions;
    - iii. Reviewing the list of accredited laboratories disclosed by the Institute for Accreditation of BiH (BATA) on its official website;
  - f. Extra-institutional, periodic monitoring which is carried out through the implementation of scientific research projects, mostly in cooperation with foreign partners. Such projects are mainly implemented through higher education and scientific research institutions. The inventory of results of such research is conducted on the basis of:
    - i. Published peer-reviewed publications in scientific journals, which are available to the general scientific community. The publications were found by searching the database of relevant journals, as well as using search engines that are focused on the search of scientific publications (such as Scirus, Google scholar etc.);
    - ii. Based on the official websites of certain projects on which research results are available (e.g. Project APOPSBAL);

The Environment, Health, Research and Development Group made an assessment of the capacity for managing POPs based on the synthesis of information collected through the items 1-3, i.e. based on the presence or absence of relevant legislation, defined competencies of the state institutions, *de facto* implementation of regulations which exist *de iure* and based on the quality of the information provided by the competent institutions in response to the inquiry.

## Annex 7- Literature sources of the POPs Pesticides Inventory Group

1. Lukač, Z., Mitrić, S., Perković, G., Janjić, V. (2001). Pregled pesticida u Republici Srpskoj. Znanstveno stručno savjetovanje agronoma Republike Srpske sa međunarodnim učešćem: "Poljoprivreda RS u novom milenijumu". Zbornik rezimea, str. 99, Teslić.
2. Mitrić, S., Janjić, V., Perković, G., Lukač, Z. (2001). Analiza prometa pesticida u Republici Srpskoj. Znanstveno stručno savjetovanje agronoma Republike Srpske sa međunarodnim učešćem: "Poljoprivreda RS u novom milenijumu". Zbornik rezimea, str. 100, Teslić.
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6. Brkić, B.(2001): " Analiza prometa pesticida u Republici Srpskoj u 2001 godini".Diplomski rad, Poljoprivredni fakultet Banja Luka.
7. Plavšić, Danijela (2002): "Analiza prometa pesticida u Republici Srpskoj u 2002 godini". Diplomski rad, Poljoprivredni fakultet Banja Luka.
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9. Konculić, Sanja (2006): "Analiza prometa pesticida u Republici Srpskoj u 2004. godini ". Diplomski rad, Poljoprivredni fakultet Banja Luka.
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11. Drinić, A. (2007): "Analiza prometa pesticida u Republici Srpskoj u 2006. godini". Diplomski rad, Poljoprivredni Fakultet Banja Luka.
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## Annex 8- Results of air quality monitoring

Reporting year	Name of company	Location	Name of pollutant	Total (kg/a)	Unintentional emissions (kg/a)	Diffuse emissions (kg/a)
2011	ArcelorMittal d.o.o.	Zenica	PAH	5	0	11.355
2011	ArcelorMittal d.o.o.	Zenica	PAH	11	0	75.9
2011	ArcelorMittal d.o.o.	Zenica	PAH	0	0	2051.28
2011	GRIOSS d. o.o. Grude	Jajce	PAH	0	0	196.99
2011	Bosnalijek d.o.o.	Sarajevo Centar	PAH	0	0	1076
2011	FEAL d.o.o. Široki Brijeg	Široki Brijeg	PAH	0	0	4.37
2011	Presal Extrusion d.o.o.	Široki Brijeg	PAH	0.00407*	0	0.00407*
2011	GP Drina Goražde	Goražde	Aldrin	0	0	0
2011	GP Drina Goražde	Goražde	Chlordane	0	0	0
2011	GP Drina Goražde	Goražde	Chlordecone	0	0	0
2011	GP Drina Goražde	Goražde	DDT	0	0	0
2011	GP Drina Goražde	Goražde	Dieldrin	0	0	0
2011	GP Drina Goražde	Goražde	Endrin	0	0	0
2011	GP Drina Goražde	Goražde	Heptachlor	0	0	0
2011	GP Drina Goražde	Goražde	Hexachlorobenzene (HCB)	0	0	0
2011	GP Drina Goražde	Goražde	1,2,3,4,5,6-Hexachlorocyclohexane (HCH)	0	0	0
2011	GP Drina Goražde	Goražde	Lindane	0	0	0
2011	GP Drina Goražde	Goražde	Mirex	0	0	0
2011	GP Drina Goražde	Goražde	PCDD + PCDF (dioxins + furans) (as TEQ)	0	0	0
2011	GP Drina Goražde	Goražde	Pentachlorobenzene	0	0	0
2011	GP Drina Goražde	Goražde	Pentachlorophenol (PCP)	0	0	0
2011	GP Drina Goražde	Goražde	Polychlorinated biphenyls (PCB)	0	0	0
2011	GP Drina Goražde	Goražde	Toxaphene	0	0	0
2011	GP Drina Goražde	Goražde	Anthracene	0	0	0
2011	GP Drina Goražde	Goražde	PAH	0	0	0
2012	GP Drina Goražde	Goražde	Aldrin	0	0	0
2012	GP Drina Goražde	Goražde	Chlordane	0	0	0
2012	GP Drina Goražde	Goražde	Chlordecone	0	0	0
2012	GP Drina Goražde	Goražde	DDT	0	0	0
2012	GP Drina Goražde	Goražde	Dieldrin	0	0	0
2012	GP Drina Goražde	Goražde	Endrin	0	0	0
2012	GP Drina Goražde	Goražde	Heptachlor	0	0	0
2012	GP Drina Goražde	Goražde	Hexachlorobenzene (HCB)	0	0	0
2012	GP Drina Goražde	Goražde	1,2,3,4,5,6-Hexachlorocyclohexane (HCH)	0	0	0
2012	GP Drina Goražde	Goražde	Lindane	0	0	0
2012	GP Drina Goražde	Goražde	Mirex	0	0	0
2012	GP Drina Goražde	Goražde	PCDD + PCDF (dioxins + furans) (as TEQ)	0	0	0
2012	GP Drina Goražde	Goražde	Pentachlorobenzene	0	0	0
2012	GP Drina Goražde	Goražde	Pentachlorophenol (PCP)	0	0	0
2012	GP Drina Goražde	Goražde	Polychlorinated biphenyls (PCB)	0	0	0

*Table 8.1: Results of the annual emissions of PAH and POPs from the list of the Stockholm Convention (Source: Register of polluters of the Federal Ministry of Environment and Tourism)*

Reporting year	Name of company	Location	Name of pollutant	Total (kg/a)	Unintentional emissions (kg/a)	Diffuse emissions (kg/a)
2012	GP Drina Goražde	Goražde	Toxaphene	0	0	0
2012	GP Drina Goražde	Goražde	PAH	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Aldrin	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Chlordane	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Chlordecone	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	DDT	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Dieldrin	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Endrin	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Heptachlor	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Hexachlorobenzene (HCB)	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	1,2,3,4,5,6-Hexachlorocyclohexane (HCH)	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Lindane	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Mirex	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	PCDD + PCDF (dioxins + furans) (as TEQ)	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Pentachlorobenzene	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Pentachlorophenol (PCP)	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Polychlorinated biphenyls (PCB)	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	Toxaphene	0	0	0
2012	d.o.o. "Herceg" Srebrenik	Srebrenik	PAH	0	0	0
2012	Aluminij	Mostar - Jug	PAH	1.35	0	1.35
2012	FEAL d.o.o.	Mostar - Jug	PAH	0.014245*		0.014245*
2012	Grudska Pivovara d.o.o. Grude	Grude	PAH	0.03033*	0	0.03033*
2012	Hercegovačka Pivovara d.o.o. Mostar	Mostar - Jug	PAH	0.0451*	0	0.0451*
2012	HP Investing d.o.o. Mostar	Mostar - Stari Grad	PAH	0	0	0
2012	HP Investing d.o.o. Mostar	Mostar - Stari Grad	PAH	0.10175*	0	0.10175*
2012	Presal Extrusion d.o.o. Široki Brijeg	Široki Brijeg	PAH	0.04884*	0	0.04884*
2012	GRAEWE TADIV d.o.o. Konjic	Konjic	PAH	0.02114*	0	0.02114*
2012	Interkomerc d.o.o. Mostar	Mostar - Jug	PAH	0.0155*	0	0.0155*
2011	BETON PERUTINA" d.o.o. ČAPLJINA	Čapljina	PAH	0.2483*	0	0.2483*
2012	„BETON PERUTINA“ d.o.o. ČAPLJINA	Čapljina	PAH	0.23604*	0	0.23604*
2012	Cement factory Kakanj	Kakanj	PAH	0	0	1376.5

\*The results were obtained by calculation, whereas for the others it is stated that they were obtained by experimental measurements based on data from the Federal Ministry of Environment and Tourism.

## Annex 9- Results of water quality monitoring

Location and year of sampling <sup>223</sup>	Number of samples taken			
	Aldrin, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, $\alpha$ HCH, $\beta$ HCH, $\gamma$ HCH, Endosulfan, DDT	Polychlorinated biphenyls (PCB)	PAH (polycyclic aromatic hydrocarbons)	
River Neretva	2006	4	4	-
	2007	4	4	-
	2008	4	4	-
	2009	24	24	-
	2010	18	-	18
	2011	48	-	72
	2012	54	-	72
	2013 (6 months)	58	58	58
River Bistrica	2006	2	2	-
	2007	2	2	-
	2008	2	2	-
	2009	4	4	-
	2010	-	-	-
	2011	-	-	12
	2012	6	-	24
	2013 (6 months)	2	2	2
Groundwater (springs and sources)	2006	16	-	-
	2007	13	-	-
	2008	13	-	-
	2009	19	19	-
	2010	21	-	-
	2011	23	-	-
	2012	27	-	-
	2013 (6 months)	-	-	-
Other rivers, lakes and drinking water <sup>224</sup>	2006	4	6	-
	2007	2	6	-
	2008	2	6	-
	2009	2	45	-
	2010	3	-	-
	2011	3	-	-
	2012	4	-	-
	2013 (months)	17	72	-

*Table 9.1:  
Results of water monitoring for the presence of POPs conducted by the Federal Institute of Public Health*

<sup>223</sup> In accordance with the Law on Water

<sup>224</sup> Rivers Bistrica, Rama, Ričina and Šuica, lakes Blidinje and Deransko

Location and year of sampling <sup>223</sup>	Number of samples taken			
	Aldrin, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, $\alpha$ HCH, $\beta$ HCH, $\gamma$ HCH, Endosulfan, DDT	Polychlorinated biphenyls (PCB)	PAH (polycyclic aromatic hydrocarbons)	
Analysed total	2006	22	6	-
	2007	21	6	-
	2008	21	6	-
	2009	49	45	-
	2010	42	-	3
	2011	74	-	3
	2012	87	-	4
	2013 (6 months)	77	72	17
	<b>TOTAL</b>	<b>393</b>	<b>135</b>	<b>285</b>
<b>Footnote:</b>	MPC in drinking water is 0.1 $\mu\text{g/l}$	MPC in drinking water is 0.1 $\mu\text{g/l}$	MPC in drinking water is 0.1 $\mu\text{g/l}$	
	All analysed parameters were below the maximum permissible concentration, and in most cases below the detection limit of the instrument.			

Table 9.2:  
Results of POPs  
monitoring provided by  
the Agency for the Water  
Area of the Adriatic Sea

Location and time of sampling	Organochlorine pesticides $\mu\text{g/l}$	Polychlorinated biphenyls $\mu\text{g/l}$	Diethylhexyl phthalate $\mu\text{g/l}$	PAH $\mu\text{g/l}$	
Trebizat - estuary	23. 05. 2011.	0.001	-	0.01	-
	22. 06. 2011.	0.001	-	0.01	-
	21. 07. 2011.	0.001	-	0.01	-
	24. 08. 2011.	0.001	-	0.01	-
	19. 09. 2011.	0.001	-	0.01	-
	24. 10. 2011.	0.001	-	0.01	-
	28. 11. 2011.	0.002	-	0.01	-
	14. 12. 2011.	0.001	-	0.01	-
	23. 01. 2012.	0.001	-	0.01	-
	27. 02. 2012.	0.001	-	0.01	-
	21. 03. 2012.	0.001	-	0.01	-
	18. 04. 2012.	0.001	-	0.01	-
	23. 05. 2012.	0.001	-	0.01	-
	27. 06. 2012.	0.001	-	0.01	-
	25. 07. 2012.	0.001	-	0.01	-
	22. 08. 2012.	0.001	-	0.01	-
	19. 09. 2012.	0.001	-	0.01	-
	17. 10. 2012.	0.001	-	0.01	-
	21. 11. 2012.	0.001	-	0.01	-
	13. 12. 2012.	0.001	-	0.01	-
	23. 01. 2013.	0.001	0.001	0.01	0.01
	28. 02. 2013.	0.001	0.001	0.01	0.01
	20. 03. 2013.	0.001	0.001	0.01	0.01
	24. 04. 2013.	0.001	0.001	0.01	0.01
	27. 05. 2013.	0.001	0.001	0.01	0.01
	27. 06. 2013.	0.001	0.001	0.01	0.01
25. 07. 2013.	0.001	0.001	0.01	0.01	
26. 08. 2013.	0.001	0.001	0.01	0.01	
Bregava upstream from Stolac	19. 03. 2013.	0.001	0.001	0.01	0.01
	27. 06. 2013.	0.001	0.001	0.01	0.01



Location and time of sampling	Organochlorine pesticides µg/l	Polychlorinated biphenyls µg/l	Diethylhexyl phthalate µg/l	PAH µg/l	
Bistrica Livno - downstream	17. 01. 2011.	-	-	0	0
	14. 02. 2011.	-	-	0	0
	23. 03. 2011.	-	-	0.01	0.01
	14. 04. 2011.	-	-	0	0
	16. 05. 2011.	-	-	0.01	0.01
	21. 06. 2011.	-	-	0.01	0.01
	18. 07. 2011.	-	-	0.01	0.01
	22. 08. 2011.	-	-	0.01	0.04
	21. 09. 2011.	-	-	0.01	0.01
	17. 10. 2011.	-	-	0.01	0.01
	14. 11. 2011.	-	-	0.01	0.01
	12. 12. 2011.	-	-	0.01	0.01
	25. 01. 2012.	-	-	0.01	0.01
	28. 02. 2012.	-	-	0.01	0.01
	28. 03. 2012.	-	-	0.01	0.01
	25. 04. 2012.	-	-	0.01	0.01
	24. 05. 2012.	-	-	0.01	0.01
	26. 06. 2012.	-	-	0.01	0.01
	26. 07. 2012.	-	-	0.01	0.01
	30. 08. 2012.	-	-	0.01	0.01
27. 09. 2012.	-	-	0.01	0.01	
25. 10. 2012.	-	-	0.01	0.01	
28. 11. 2012.	-	-	0.01	0.01	
19. 12. 2012.	-	-	0.01	0.01	
Pond Lipa	17. 01. 2011.	-	-	0.02	0
	14. 02. 2011.	-	-	0.05	0.01
	23. 03. 2011.	-	-	0.02	0
	14. 04. 2011.	-	-	0	0
	16. 05. 2011.	-	-	0.01	0.01
	21. 06. 2011.	-	-	0.01	0.01
	18. 07. 2011.	-	-	0.01	0.01
	22. 08. 2011.	-	-	0.01	0.01
	21. 09. 2011.	-	-	0.01	0.01
	17. 10. 2011.	-	-	0.01	0.01
	14. 11. 2011.	-	-	0.01	0.01
	12. 12. 2011.	-	-	0.01	0.01
	25. 01. 2012.	-	-	0.01	0.01
	28. 02. 2012.	-	-	0.01	0.01
	28. 03. 2012.	-	-	0.01	0.01
	25. 04. 2012.	-	-	0.01	0.01
	24. 05. 2012.	-	-	0.01	0.01
	26. 06. 2012.	-	-	0.01	0.01
	26. 07. 2012.	-	-	0.01	0.01
	30. 08. 2012.	-	-	0.01	0.01
27. 09. 2012.	-	-	0.01	0.01	
25. 10. 2012.	-	-	0.01	0.01	
28. 11. 2012.	-	-	0.01	0.01	
19. 12. 2012.	-	-	0.01	0.01	
Mean value	-	-	0.01	0.01	
Minimum	-	-	0	0	
Maximum	-	-	0.05	0.01	

Location and time of sampling		Organochlorine pesticides µg/l	Polychlorinated biphenyls µg/l	Diethylhexyl phthalate µg/l	PAH µg/l
Hydro acc. Grabovica - Jablanica	23.01.2013.				
	20.03.2013.	0.001	0.001	0.01	0.01
	24.04.2013.	0.001	0.001	0.01	0.01
	27.05.2013.	0.001	0.001	0.01	0.01
	24.06.2013.	0.001	0.001	0.01	0.01
	25.07.2013.	0.001	0.001	0.01	0.01
	26.08.2013.	0.001	0.001	0.01	0.01
Neretva Dračevo	November 2008. / August 2013				
	Mean value	0.001	0.001	0.01	0.01
	Minimum	0.001	0.001	0.01	0.01
	Maximum	0.003	0.001	0.08	0.03

Table 9.3:  
Results of POPs monitoring conducted by PI "Vode Srpske" in 2007

Name of substance	Una Novi grad - upstream	Sana	Vrbanja - profile Vr1	Drinjača - profile Dr1	Usora profile-Us-1
	27. 09. 07.	30. 10. 07.	25. 09. 07.	18. 10. 07.	02. 10. 07.
Benzo(b)fluoranthene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1
Endosulfan I	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan sulfate	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Gama - BHC	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
4,4'-DDT	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
PCBs	< 0.01	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	< 0.1	< 0.1	< 0.1	< 0.1	< 0.1

All values are expressed in mg/m<sup>3</sup>

Table 9.4:  
Results of POPs monitoring conducted by PI "Vode Srpske" in 2007

Name of substance	Vrbas - profile Novoselje	Vrbas - Delibašino Village	Drina - profile Bastasi	Čehotina - profile Č-1
	17. 09. 2007.	03.10.2007.	10. 09. 2007.	10. 09. 2007.
Benzo(b)fluoranthene	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	< 0.1	< 0.1	< 0.1	< 0.1
Benzo(a)pyrene	0.1	< 0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	< 0.1	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	< 0.1	< 0.1	< 0.1	< 0.1
Endosulfan I	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan II	< 0.01	< 0.01	< 0.01	< 0.01
Endosulfan sulphate	< 0.01	< 0.01	< 0.01	< 0.01
Gama - BHC	< 0.01	< 0.01	< 0.01	< 0.01
Heptachlor	< 0.01	< 0.01	< 0.01	< 0.01
4,4'-DDT	< 0.01	< 0.01	< 0.01	< 0.01
PCBs	< 0.01	< 0.01	< 0.01	< 0.01
Hexachlorobenzene	< 0.1	< 0.1	< 0.1	< 0.1

All values are expressed in mg/m<sup>3</sup>



*Table 9.5:  
Results of POPs  
monitoring conducted  
by PI "Vode Srpske" in  
2008*

Name of substance	Spreča – profil Sp-1	Una – Kozarska Dubica	Vrbas - Razboj
	07. 11.2008.	06.11.2008.	02.09.2008.
Benzo(b)fluoranthene	< 0.1	< 0.1	< 0.1
Benzo(k)fluoranthene	0.027	< 0.1	< 0.1
Benzo(a)pyrene	<0.1	< 0.1	< 0.1
Benzo(g,h,i)perylene	< 0.1	< 0.1	< 0.1
Indeno(1,2,3-cd)pyrene	< 0.1	< 0.1	< 0.1
Endosulfan I	-	< 0.01	< 0.01
Endosulfan II	-	< 0.01	< 0.01
Endosulfan sulfate	-	< 0.01	< 0.01
Gama – BHC	-	< 0.01	< 0.01
Heptachlor	-	< 0.01	< 0.01
4,4'-DDT	-	< 0.01	< 0.01
PCBs	-	< 0.01	< 0.01
Hexachlorobenzene	-	< 0.1	< 0.1

All values are expressed in mg/m<sup>3</sup>

*Table 9.6:  
Results of POPs  
monitoring conducted  
by PI "Vode Srpske" at  
the site Una – Kozarska  
Dubica in 2010*

Name of substance	I	II	III	IV	V
	16.03.2010.	20.04.2010	28.05.2010.	08.07.2010.	16.08.2010.
Aldrin	-	-	-	-	-
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01
Gama –BHC Lindane	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	< 0.020	<0.015	<0.015	<0.015	<0.015
Benzo(b)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene	<0.002	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene	<0.002	<0.001	<0.001	<0.001	<0.001
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>



*Table 9.7:  
Results of POPs  
monitoring conducted  
by PI "Vode Srpske" at  
the site Vrbas – Razboj  
in 2010*

Name of substance	I	II	III	IV	V
	17.03.2010.	28.04.2010.	29.05.2010.	08.07.2010.	26.08.2010.
Aldrin	-	-	-	-	-
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01
Gama –BHC Lindane	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	< 0.020	<0.015	<0.015	<0.015	<0.015
Benzo(b)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene	<0.002	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene	<0.002	<0.001	<0.001	<0.001	<0.001
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>

*Table 9.8:  
Results of POPs  
monitoring conducted by  
PI "Vode Srpske" at the  
site Sava – Rača in 2010*

Name of substance	I	II	III	IV	V
	19.03.2010.	15.04.2010.	14.05.2010.	26.07.2010.	31.08.2010.
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01
Gama –BHC Lindane	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	< 0.020	<0.015	<0.015	<0.015	<0.015
Benzo(b)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene	<0.002	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene	<0.002	<0.001	<0.001	<0.001	<0.001
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>



*Table 9.9:  
Results of POPs  
monitoring conducted by  
PI "Vode Srpske" at the  
site Bosna – upstream  
the mouth of Spreča in  
2010*

Name of substance	I	II	III	IV	V
	17.03.2010.	28.04.2010.	17.06.2010.	12.07.2010.	12.07.2010.
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01
Gama –BHC Lindane	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	< 0.020	<0.015	<0.015	<0.015	<0.015
Benzo(b)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene	<0.002	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene	<0.002	<0.001	<0.001	<0.001	<0.001
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>

*Table 9.10:  
Results of POPs  
monitoring conducted  
by PI "Vode Srpske" at  
the site Drina – Foča  
in 2010*

Name of substance	I	II	III	IV	V
	18.03.2010.	12.04.2010.	13.06.2010.	29.06.2010.	10.08.2010.
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01
Gama –BHC Lindane	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	< 0.020	<0.015	<0.015	<0.015	<0.015
Benzo(b)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene	<0.002	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene	<0.002	<0.001	<0.001	<0.001	<0.001
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>





*Table 9.11:  
Results of POPs  
monitoring conducted  
by PI "Vode Srpske" at  
the site Sava – Gradiška  
in 2010*

Name of substance	I	II	III	IV	V
	15.03.2010.	13.04.2010.	25.05.2010.	21.07.2010.	16.08.2010.
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01
Gama –BHC Lindane	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	< 0.020	<0.015	<0.015	<0.015	<0.015
Benzo(b)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene	<0.002	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene	<0.002	<0.001	<0.001	<0.001	<0.001
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>

*Table 9.12:  
Results of POPs  
monitoring conducted  
by PI "Vode Srpske" at  
the site Bosna – Modriča  
in 2010*

Name of substance	I	II	III	IV	V
	15.03.2010.	28.04.2010.	17.06.2010.	14.07.2010.	30.08.2010.
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01
Gama –BHC Lindane	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	< 0.020	<0.015	<0.015	<0.015	<0.015
Benzo(b)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene	<0.002	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene	<0.002	<0.001	<0.001	<0.001	<0.001
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>



*Table 9.13:  
Results of POPs  
monitoring conducted by  
PI "Vode Srpske" at the  
site Drina – Pavlovića  
Bridge in 2010*

Name of substance	I	II	III	IV	V
	18.03.2010.	15.04.2010.	31.05.2010.	28.07.2010.	31.08.2010.
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01
Gama –BHC Lindane	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	< 0.020	<0.015	<0.015	<0.015	<0.015
Benzo(b)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene	<0.002	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene	<0.002	<0.001	<0.001	<0.001	<0.001
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>

*Table 9.14:  
Results of POPs  
monitoring conducted  
by PI "Vode Srpske" at  
the site Una – upstream  
in 2010*

Name of substance	I	II	III	IV	V
	16.03.2010.	14.04.2010.	27.05.2010.	07.07.2010.	16.08.2010.
Aldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Dieldrin	<0.01	<0.01	<0.01	<0.01	<0.01
Endrin	<0.01	<0.01	<0.01	<0.01	<0.01
DDT total	<0.01	<0.01	<0.01	<0.01	<0.01
Endosulfan I	<0.01	<0.01	<0.01	<0.01	<0.01
Hexachlorobenzene	<0.01	<0.01	<0.01	<0.01	<0.01
Gama –BHC Lindane	<0.01	<0.01	<0.01	<0.01	<0.01
Benzo(a)pyrene	< 0.020	<0.015	<0.015	<0.015	<0.015
Benzo(b)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Benzo(g,h,i)perylene	<0.002	<0.001	<0.001	<0.001	<0.001
Benzo(k)fluoranthene	<0.01	<0.008	<0.008	<0.008	<0.008
Indeno(1,2,3-cd)pyrene	<0.002	<0.001	<0.001	<0.001	<0.001
Pentachlorobenzene	<0.05	<0.05	<0.05	<0.05	<0.05

All values are expressed in mg/m<sup>3</sup>



## Annex 10 - Results of soil quality monitoring

*Table 10.1:  
PAH contents in soil  
(mg/kg of soil) in  
2008 (listing only  
results greater than  
zero) – Source: the  
Federal Institute for  
Agropedology*

Number of samples	Polycyclic aromatic hydrocarbons – PAH (mg/kg of soil)						
	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene
30	0.230	0.240	0	0	0	0	0
49	0	0	0	0	0	0.250	0
58	0	0	0	1.370	0	0	0
59	0	0	0	0.220	0	0	0
60	0	0	0	0.310	0	0.690	0
67	0	0	0	0	0	0	0
68	0	0	0	0	0	0	0
69	0	0	0	0.210	0	0	0
70	0	0	0	0.350	0	0.060	0
71	0	0	0	0.300	0	0	0
72	0	0	0	0.220	0	0	0
79	0	0	0	0	0	0	0
80	0	0	0	0	0.340	0	0
87	0	0	0	0	0	0	0
88	0	0	0	0	0	0	0
89	0	0	0	0	0	0	0
91	0	0	0	0.450	0	1.110	0
95	0	0	0	0	0	0	0
96	0	0	0	0	0	0	0
97	0	0	0	0	0	0	0
98	0	0	0	0	0	0	0
107	0	0	0	0	0	0	0
113	0	0	0	0	0	0	0
116	0	0	0	0	0	0	0
118	0	1.000	0.950	0	0.520	0	0
119	0	0.510	0	0	0	0.190	0.900
123	0	0	0	0.405	0	0	0
124	0	0	0.460	0	0	0	0
125	0	1.600	0	0	1.700	0	0
126	0	0.180	0	0	0	0	0
128	0	0	0	0	0.660	0.011	0.360
129	0	0.890	0	0	0	0	0
131	0	0	0	0	0	0	0
133	0	0	0.700	0	0	0	0
141	0	0	0	0	0	0	0
142	0	0.380	0.380	0	0	0	0
143	0	0.490	0	0	0	0	0
146	0	0	0	0	0	0	0.850
147	0	0	0	0	0	0	0
148	0	0	0	0	0	0	0
149	0	0	0	0	0	0	0
158	0	0.930	0	0.250	0	0	0
177	0.31	0	0	0	0	0	0
180	0	0	0	0	0	0	0

	Pyrene	Benzo (A) anthracene+chrysene	Benzo(B) fluoranthene +benzo(K) fluoranthene	Benzo(A)pyrene + indenopyrene	Dibenzoanthracene	Benzoperylene
	0	0.460	0.150	0	0	0.170
	0	0.306	0	0	0	0
	0	0.420	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0.470
	0	0	0	0	0	0.360
	0	0	0	0	0	0
	0	0	0	1.610	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0.910	0
	0	0.700	0.610	0	0	0.630
	0	0.420	0	0	0	0
	0	0	0	0.678	0	0
	0	0.504	0	0	0	0
	0	0.230	0	0	0	0
	0	0	0	0	0	0.070
	0.800	0	0	0	0	0.920
	0	0	0	0	0	0
	0	0.040	0.050	0	0	0.230
	0	0.060	0	0	0	0
	0	1.150	0	0	0	0
	0	0.120	0	0	0	0.080
	0	0.950	0.800	0	0	0
	0	0.880	0	0	0	0
	0	0	0	0	0	0
	0	0.801	0.540	0	0	0
	0	0	1.700	0	0	0
	0	0.570	0.840	0	0	0
	0.090	0.720	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0.080
	0	0.280	0.160	0	0	0
	0	0	1.310	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0.100
	0	0	0	0	0	0.120
	0	0.540	0.350	0	0	0.170
	0	0	0	0	0	0.070
	0	0.480	0	0	0	0
	0	0	0	0	0	0
	0	0.043	0	0.623	0	0

Number of samples	Polycyclic aromatic hydrocarbons – PAH (mg/kg of soil)						
	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene
207	0	0	0	0	0	0.603	0
216	0.120	0.120	0	0	0	0	0
219	0	0	0	0	0	0	0
221	0	0.917	1.058	0	0	0	0.769
225	0	0.782	0.931	0	0	0	0.768
227	0	0.733	1.055	0	0	0	0.799
234	0	0	0	0	1.773	0	0
237	0.502	0	0.927	0.299	0	0	1.098
238	0	0	1.057	1.419	0	0	0
240	0	0.452	0.456	0	0	0	1.023
244	0	0.942	0.894	0.682	0	0	0
245	0	0.442	0.497	1.802	0	0	0.816
246	0	0.764	0.862	1.620	0	0	1.178
247	0.686	0.782	0.482	1.589	0	0	1.242
250	0	0.414	0.597	0	0	0	0.831
251	0	0	0	0	0	0	0
252	0	0.416	0.580	0	0	0	0.672
253	0	0.691	0.523	0	0	0	1.147

*Table 10.2:  
PAH contents in soil  
(mg/kg of soil) in  
2009 (listing only  
results greater than  
zero) – Source: the  
Federal Institute for  
Agropedology*

Number of samples	Polycyclic aromatic hydrocarbons – PAH (mg/kg of soil)						
	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene
20	0	0	0	0	0	0	0
30	0	0	0	0	0	0	0
33	0	0	0	0.610	0	0	0
45	0	0	0	0	0	0	0
46	0	0	0	0	0	0	0
68	0	0	0.045	0	0	0	0
81	0	0	0.060	0	0	0	0
98	0	0	0.017	0	0	0	0
131	0	0	0	0	0	0	0
146	0.154	0	0	0	0	0	0
163	0.132	0	0	0.29	0	0	0
166	0	0	0	0.140	0	0	0
174	0	0	0	0.060	0	0	0
190	0	0	0	0	0	0	0
206	0	0	0	0	0	0	0
210	0	0	0	0	0	0	0
214	0	0	0.032	0	0	0	0
221	0.065	0	0	0	0	0	0
228	0	0	0	0	0	0	0
229	0	0	0	0	0	0	0



	Pyrene	Benzo (A) anthracene+chrysene	Benzo(B) fluoranthene +benzo(K) fluoranthene	Benzo(A)pyrene + indenopyrene	Dibenzoanthracene	Benzoperylene
	0	0	0	0	0	0
	0.160	0	0.680	0	0	0.410
	0.090	0.860	0.170	0	0	0.210
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0.698	0	0	0	0	0
	0	0	0	0	0	0
	0.454	0	0	0	0	0
	0.741	0	0	0	0	0
	0	0	0	0	0	0
	0.999	0	0	0	0	0
	0.696	1.489	0	0	0	0
	0.426	1.346	0	0	0	0
	0	0	0	0	0	0
	0.312	0	0	0	0	0
	1.276	0	0	0	0	0

	Pyrene	Benzo (A) anthracene+chrysene	Benzo(B) fluoranthene +benzo(K) fluoranthene	Benzo(A)pyrene + indenopyrene	Dibenzoanthracene	Benzoperylene
	0	0	0.288	0	0	0
	0	0	0.783	0.104	0	0
	0	0.017	0.022	0	0.010	0
	0	0	0.750	0	0	0
	0	0	0.643	0	0	0
	0	0	0.153	0	0	0
	0	0	0.159	0	0	0
	0.100	0	0.067	0.086	0	0
	0	0	0.168	0	0	0
	0	0.154	0.178	0	0	0
	0	0	0.386	0	0	0
	0.085	0	0	0.232	0	0.100
	0	0	0	0	0	0
	0	0	0.112	0.027	0	0
	0.544	0	0.212	0	0	0
	0	0	0.624	0	0	0
	0	0	0.553	0	0	0
	0	0	0	0	0	0
	0	0	0.216	0.279	0	0
	0	0	0.339	0.096	0	0

*Table 10.3:  
PAH contents in soil  
(mg/kg of soil) in  
2010 (listing only  
results greater than  
zero) – Source: the  
Federal Institute for  
Agropedology*

Number of samples	Polycyclic aromatic hydrocarbons – PAH (mg/kg of soil)						
	Naphthalene	Acenaphthylene	Acenaphthene	Fluorene	Phenanthrene	Anthracene	Fluoranthene
2	0.068	0	0	0	0	0	0
12	0.126	0	0	0	0	0	0
33	0	0.346	0	0	0	0	0
36	0	0	0	0	0	0	0
37	0	0	0	0	0	0	0
38	0	0	0	0	0	0	0
44	0.559	0	0	0	0	0	0
45	0	0	0	0	0	0	0
47	0	0	0	0	0	0	0
54	0	0	0	0	0	0	0
56	0	0	0	0	0	0	0
81	0.212	0	0	0	0	0	0
98	0.371	0	0	0	0	0	0
121	0	0	0	0	0	0	0
130	0.423	0	0	0	0	0	0
134	0	0	0	0	0	0	0
151	0.655	0	0	0	0	0	0
177	0.310	0	0	0	0	0	0
190	0	0	0	0	0	0	0
225	0	0	0	0	0	0	0
228	0	0	0	0	0.135	0	0
229	0	0	0	0	0	0	0
252	0.322	0	0	0	0	0	0

## Annex 11- Exposure to POPs and impact on human health

### Annex 11 a) – Impact of POP pesticides on human health

Organochlorinated pesticides are halogen derivatives of ethane, cyclohexane, benzene and cyclohexane. Although they generally belong to the group of pesticides, their primary role is to control insects, and so it is more proper to call them insecticides. Regardless of differences in the structure, all of them have a number of common chemical and physical properties that put them all together into the group of persistent organic pollutants. These properties are: high lipid solubility, semi-volatility, resistance to various physical and chemical factors which ensures their persistency in the environment, and the tendency to accumulate in fat tissue (bioaccumulation) and move up a food chain from the lower life forms to higher (biomagnification). When pure, all of them appear as white or yellowish crystal substances with low water solubility, but good solubility in a whole number of organic solvents and fats. When found in pesticide formulations, they are dissolved in a matrix that contains solvents, emulsifiers and other agents that facilitate their application in the environment and on large areas but also their penetration into the bodies of insects and warm-blooded animals as well. Even as pure substances they can enter the body by direct contact through skin, lungs and digestive system, and if they are dissolved in various pesticide formulations that can be applied as aerosol, their body penetration is considerably facilitated and accelerated. Once in the body, they mostly deposit in the fat tissue and are very slowly subjected to metabolic transformation processes that can favor elimination. This is why their half-life is between several weeks and several months.

	Pyrene	Benzo (A) anthracene+chrysene	Benzo(B) fluoranthene +benzo(K) fluoranthene	Benzo(A)pyrene + indeno(1,2,3-cd)pyrene	Dibenzoanthracene	Benzoperylene
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	1.163	0	0	0	0
	0	1.56	0.288	0	0	0
	0.417	0	0.102	0	0	0
	0	0.422	0	0	0	0
	0	1.048	0	0	0	0
	0	1.099	0	0	0	0
	0	1.134	0	0	0	0
	0	1.538	0	0	0	0
	0	0	0	0	0	0
	0	0	0.221	0	0	0
	0	0	0.055	0	0	0
	0	0	0	0	0	0
	0	0	0.267	0	0	0
	0	0	0	0	0	0
	0	0	0	0	0	0
	0	0	0.112	0.027	0	0
	0	0	0.350	0	0	0
	0	0	0.135	0	0	0
	0	0	0.036	0.063	0	0
	0	0	0	0	0	0

They can enter the environment after an accident, release from waste disposal sites, use in agriculture and forestry or air transmission to remote areas where they have never been used. Their main source for most people today is consumption of foods contaminated with residues of these pesticides. The most important sources are fishes, particularly the ones caught in sports fishing, then meat, poultry and eggs. Although the legal use of most of the mentioned substances has been completely abandoned, exposure may occur either through an illegal manipulation of the remaining pesticides or the preparations containing DDT the application of which is allowed in specific cases. Some of those insecticides were used to kill insects, ants and termites in stables and houses. Individuals living in or near such infected buildings could be exposed to the effects of organochlorine pesticides even years after their use. Special case includes anti-ectoparasitic agents containing lindane, used for treatment of humans and cattle and had been legally used in Bosnia and Herzegovina until 2003.

The data on the toxicity of organochlorine pesticides and their impact on human health can be collected by studying occupational poisonings of persons working with those substances or by epidemiological studies or through experiments on animals. These experiments still represent the most important source of all scientific data, particularly when it comes to the studying of action mechanisms, and long-term examination of carcinogenic and genotoxic potential of these substances.

Although different in their chemical structure and although with not always the same mechanisms of toxic action, all chlorinated insecticides belong to the group of convulsive poisons, which means that in acute poisoning cases they cause severe convulsions that may lead to death. This action is manifested through the effect of organochlorinated insecticides on ion channels in the central nervous system but also on neurotransmitters as well. Intake of small doses usually results in the paresthesia of the tip of the tongue, motor disorder and tremor

which can later transform into severe convulsions and be fatal. Secondary manifestations are accelerated pulse (tachycardia), higher temperature and metabolic acidosis. Death usually occurs due to respiratory arrest.

In case of acute intoxication with aldrin or dieldrin, very severe convulsions can occur suddenly without prodromal signs (Hoogendam et al. 1965). Acute exposure to lindane, which is in fact a gamma isomer of hexachlorocyclohexane (HCH), leads to heart rhythm disorders, and about 15% of the workers employed in lindane production had EEG changes. In cases of subchronic intoxication with aldrin and dieldrin severe EEG disorders occurred, imitating changes that occur in epilepsy (Jager 1970). Long-term monitoring of workers occupationally exposed to aldrin and dieldrin did not show the development of neurodegenerative disorders (de Jong 1997) but that same study revealed considerably higher incidence of mental disorders, particularly in persons younger than 30 and as well in those aged 46-50.

As in the case of most other persistent organic pollutants, acute toxicity has far less public health significance than the consequences of long-term exposure to these compounds.

Although there is no sufficiently strong evidence that DDT is hepatotoxic to humans, animal experimentation undoubtedly proves it. As for aldrin and dieldrin, collected during epidemiological studies also show no such evidence on hepatotoxic effect of these compounds, but animal experiments show that administering aldrin and dieldrin leads to the increase in liver mass (Bandyopadhyay et al. 1982) and ballooned hepatocytes (Olson et al. 1980). As for lindane, a significant correlation was established between its increased blood concentrations in occupational workers and increased enzyme activities which are characteristic for liver damage (Kashyap 1986).

Occupational exposure to DDT is related to an increased risk of lung cancer incidence (De Stefani et al 1996). It is proven that the increased blood concentration of DDT, and as well its metabolite DDE, is related to an increased risk of liver cancer incidence (McGlynn et al 2006). Since o,p-isomer of DDT manifests estrogenic effect, a possibility of impact of DDT and its isomers and metabolites on breast cancer incidence was examined. An increased risk of that cancer in persons with increased DDT levels in the body was established (Charlier et al. 2004). However, other studies have determined that the exposure to p,p-DDE does not pose an increased risk of breast cancer incidence (Cohn et al. 2007), so this problem requires additional examinations. According to the IARC (International Agency for Research on Cancer) classification, aldrin and dieldrin are not carcinogenic to humans. As for lindane, there is evidence of its causing liver cancer in experimental animals (Wolff et al. 1987). Due to inconclusive evidence that would certainly verify such effect on humans as well (the fact that there is no such evidence does not mean that lindane is not carcinogenic to humans), IARC (IARC 1998) classifies all HCH isomers as possibly carcinogenic to humans (Group 2B).

The impact of DDT and its metabolites on endocrine system and body immune responses is proved well. The analysis of p,p-DDE concentration in the serum samples taken from women in Sweden showed a statistically significant correlation with diabetes (Rignell-Hydbom et al. 2007). The analysis of DDE in serum samples taken from children in Germany showed a significant correlation between increased immunoglobulin E (IgE) concentrations and asthma (Karmaus et al. 2001, 2003). Considerably increased asthma morbidity and mortality were also found in adults that were occupationally exposed to DDT (Beard et al. 2003).

Because of above-mentioned estrogenic effects of DDT isomers and metabolites, various examinations of impacts of these compounds on women's reproductive health have been conducted. Comparison of 15 women who had spontaneous abortions and 15 women with normal delivery established considerably higher concentrations of p,p-DDE in women who miscarried (Korrick et al. 2001). An examination of 2033 men occupationally exposed to DDT established a statistically significant increased number of children born with defects (Salazar-Garcia et al. 2004). Exposure of experimental animals to lindane could lead to ovarian cycle disorders, extend the estrus cycle and reduce the degree of ovulation (Uphouse and Williams 1989).

Animal experimentation has shown that prenatal exposure to DDT could cause problems in the development of male reproductive organs and affect male reproductive health. As for the impact of aldrin and dieldrin on reproductive health, a certain decrease of fertility in tested animals was observed.

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### Annex 11 b) – Exposure to PCB and impact on human health

Owing to their physical and chemical properties, polychlorinated biphenyls (PCB) fully meet the criteria set by the UN Economic Commission for Europe, according to which they can be classified as persistent organic pollutants (UNECE, 1998). These criteria imply high lipid solubility which is expressed as the octanol-water partition coefficient and must exceed 5000 (or as the logarithm of that partition coefficient, i.e.,  $\log P > 5$ ), substance vapor pressure must be less than 1 kPa, half-life in air more than two days, in water more than two months, and in soil and sediments more than six months, which is a consequence of high chemical inertness of PCBs. Their toxicity must be proved at the same time, which is in case of PCBs proved in a number of studies and publications.

High lipid solubility of PCBs not only contributes to their stability in the environment but also leads to bioaccumulation and biomagnification. Bioaccumulation implies accumulation of these compounds in fat tissue, where they remain for a longer time period because of slow metabolism and elimination from the body, which is mainly the consequence of PCB's high lipid solubility and inertness. Bioaccumulation is particularly present in fishes and sea food. Biomagnification means that PCBs move up a food chain and accumulate in life forms that are on the top of the chain, primarily humans but also different bird species that feed on fish.

In technical products, and accordingly in the environment, polychlorinated biphenyls appear as a mixture of various isomers called congeners.

Owing to their broad application and regardless that they are considerably less in use today, PCBs can be found in various places in the environment and also in various foods. An additional contribution to this is a fact that PCBs can emerge unintentionally and that, owing to its moderate volatility, they can be transmitted through the air to remote areas where they have never been used. People can be exposed to PCBs in the workplace or accidentally, in the contact with contaminated environment and intake of foods containing PCBs.

Since the use of PCBs considerably decreased and their new applications have been prohibited, it is regarded today that the highest probability of occupational exposure to these compounds is confined to workers repairing or maintaining old transformers and capacitors still containing PCB dielectric fluid (Altenkirch et al. 1996; Hay and Tarrel 1997), construction workers who remove old paint, plaster or floor finishes containing PCBs (Herrick et al. 2004; Herrick et al. 2007; Rudel et al. 2008), workers at hazardous waste disposal sites (Gonzalez et al. 2000), and firefighters that remediate consequences of fires and breakdowns in factory plants containing PCBs (Kelly et al. 2002).

Accidental exposure to PCB from the environment could come from leaking oils from old and discarded transformers, unsanitary disposal of waste, contaminated soil and water, and also because of incineration of various materials whose incomplete combustion may generate PCBs (Dyke et al., 2003).

The PCB presence in air was disregarded for a long time, but today it is known that workers occupationally exposed to PCB (e.g., workers working with capacitors) intake about 80% of the total PCB dose through lungs (Wolff 1985). In old buildings, built before 1970, PCB air concentrations can be extremely high because of the use of sealant mixtures containing 4–9% of PCB.

For most of other people, who are not occupationally exposed to PCB, and for those who do not live near a waste disposal site, the most important PCB sources are foods. In this case, fish is the most important, specifically fishes caught through sports fishing in contaminated rivers and lakes. Although the products of animal origin are the main sources of PCB ingested through food, the cases of contaminated oil that can be used for human or animal consumption must not be disregarded, which is a way for PCBs to enter the human body through the food chain.

A particularly dangerous way of PCB ingestion is through breast milk. Children are particularly group at risk for several reasons. Before all, their body mass is lower and so lower doses of PCB can cause more serious consequences in children than in adults. Further, as a rule, children's diet differs from adults' diet, so children can intake higher PCB doses through some contaminated products. In addition, children often play in places where waste is disposed or they play with the products that might contain PCB traces (parts of electronic devices, computer equipment, fluorescent lamps, etc.) and so they intake higher amounts of PCB into the body than adults. As a rule, individuals exposed to such compounds before their birth and during first years of life suffer the most severe consequences of chronic exposure to PCB, which additionally emphasizes the importance of determining the PCB concentration in breast milk.

Having in mind the exposure pathways, all kinds of ways are possible in case of PCBs: dermal contact (through skin) in case of contact with a material containing PCBs, oils, soil and even while bathing in contaminated water, through lungs, by inhaling PCB evaporation and through digestive system, by intake of contaminated food and water. In case of persons that are not occupationally exposed to PCB, intakes through digestive and respiratory systems represent the main PCB pathways to body.

In case of PCBs there are both plenty experimental and epidemiological data that prove an entire range of various adverse effects.

As for acute poisonings, there are no data about fatal outcomes of short-term human exposure to higher PCB doses. The most often disorders in such cases are acnes and skin rash. The experiments in which laboratory animals inhaled air saturated with PCB vapors for 20 days also did not lead to fatal outcome. The medium lethal dose (LD50) for a rodent after peroral intake is between 1010 mg/kg for Aroclor 1254 (Garthoff et al. 1981) and 4250 mg/kg for Aroclor 1242 (Bruckner et al. 1973).

As for subchronic and chronic poisonings, it has been known long that PCB has an impact on increased incidence of cardiovascular diseases and increased resulting mortality of workers occupationally exposed to PCB. It is proved that a five-year exposure can be followed by a latency period of up to 20 years after which the PCB impact on cardiovascular system is manifested (Gustavsson and Hogstedt 1997). Experiments with rodents have also shown that exposure to PCB, particularly to congener 126, increases the incidence of spontaneous cardiomyopathy, increases blood pressure and the level of blood cholesterol (Lind et al 2004).

The impact of PCB on endocrine system has been described in many cases, particularly owing to the fact that some congeners manifest estrogenic effect, thus interfering with the body processes that are dependent on the level of estrogenic hormones. In addition, PCBs affect the level of thyroid hormones, thus affecting not only physiological processes in the body but also cognitive characteristics and learning ability. It has been proved that PCBs decrease the level of thyroxine and triiodothyronine in blood (Brouwer et al. 1998), which has direct consequences on the development of the central nervous system and, ultimately, on IQ.

Examinations of Swedish fishermen showed a significant correlation between the level of PCB-153 congener in serum and incidence of diabetes mellitus type 2 in such individuals (Rylander et al. 2005). Similar results proving the impact of PCB on the incidence of diabetes were published by other authors as well (Vasiliu et al. 2006; Chen et al. 2008; Codru et al. 2007; and Wang et al. 2005).

Immunological changes in individuals exposed to PCB (most often through contaminated foods) have been observed both in adults and children. These changes are manifested in increased sensitivity to respiratory infections, increased sensitivity to ear infections in children and reduced level of immunoglobulin M (IgM) and immunoglobulin G (IgG). Lower antibody production is also described in cases of children perinatally exposed to PCB after antidipteria and antitetanus vaccinations (Heilman et al. 2006).

Genotoxic effect and the occurrence of malignant diseases are one of the most severe and most serious toxic effects of PCBs. There are various theories explaining the mechanism of such PCB effects, including the stimulation of estrogenic receptors, oxidative stress and damage to DNA, and covalent binding of PCB metabolites to nucleic acids and other cell macromolecules. For a long time the International Agency for Research on Cancer, as part of WHO, classified PCB into Group 2A – substances probably carcinogenic to humans. This classification is based on the existence of sufficiently certain evidence obtained through animal experimentation that a substance is carcinogenic until sufficient results of epidemiological studies of humans certainly prove carcinogenic effect. This classification used to regard PCBs as probable cancerogens that lead to cancers of liver and bile ducts, and particularly various lymphomas and malignancy of blood and hematopoietic organs (Hodgkin and non-Hodgkin lymphomas). The latest researches, however, undoubtedly prove that some PCB congeners are carcinogenic, and so PCB-126 congener is today classified into Group 1, a proven carcinogen to humans (Baan et al. 2009). A statistically significant correlation between increased PCB concentration in serum and the incidence of non-Hodgkin lymphoma was proved (Engel et al. 2007), and as well the relation between PCB concentrations in serum and incidence of testicular cancer (McGlynn et al. 2009). Finally, in February 2013, 26 experts from 12 different countries met in Lyon and decided that IARC should classify PCB into Group 1, as carcinogenic to humans (Lauby-Secretan B et al. 2013).

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### Annex 11 c) – Exposure to dioxins and furans

Chlorinated dibenzo-p-dioxins are a family of 75 structurally related substances (congeners) including well-known 2,3,7,8-tetrachlorodibenzo-p-dioxin (TCDD). Based on the toxic effect similar to CDD, a broad group of chlorinated aromatic compounds is defined and called "dioxin-like substances." Some polychlorinated dibenzofurans (PCDF), some polychlorinated biphenyls (PCB), some polychlorinated diphenyl ethers, polybrominated naphthalenes and other compounds belong to this group. Brominated compounds and mixed, chlorobromo derivatives can also be dioxin-like substances (Van den Berg et al. 1998). Belonging to this group is determined on the basis of similar biological effects: dioxin-like substances lead to the occurrence of a similar range of toxic effects caused by the same mechanism. The essence of that mechanism of action is binding of dioxin-like compounds to the protein called Ah receptor (AhR). These compounds have planar molecules of these compounds which facilitates their binding to AhR, and the level of their effect largely depends on how good they bind to the receptor. TCDD has a very high affinity of binding to AhR, thus manifesting an extremely strong effect. The above-mentioned 2,3,7,8-tetrachlorodibenzo-p-dioxin and 1,2,3,7,8-pentachlorodibenzo-p-dioxin are regarded as the most toxic. Other planar molecules of a similar size and shape, including chlorinated dibenzo-p-dioxins and dibenzo-p-furans, have approximately the same binding affinity, and thus they manifest the effect of a similar intensity. Although some PCB congeners have low-affinity binding to AhR, their presence in the environment in relatively high concentrations makes them toxicologically highly important. PCB congeners with a chlorine atom (or atoms) in a position preventing planar configuration of the molecule do not bind to AhR and manifest their effect through other mechanisms (Seegal et al. 1991).

Unlike industrially produced PCBs that can still be found in use in some places, chlorinated dibenzo-p-dioxins (CDD) and chlorinated dibenzofurans (CDF) are undesired by-products. At first it was thought that their origin comes from a synthesis of some herbicides, derivatives of phenoxy carboxylic acids, but it is known today that a number of syntheses and sources can generate these compounds and their release into the environment. They were discovered in the emissions from incinerators of municipal waste (Olie K et al. 1977), although it was not known whether the emissions originated from uncombusted CDD and CDF from the fuel or from chlorinated organic precursors or it was a *de novo* synthesis. It is regarded today that CDD and CDF form during the cooling of smokes billowing from burn pits in incineration plants, at a temperature of 300 °C. Various mechanisms in which metal traces can serve as important catalysts have been proposed, and the chlorine sources for these syntheses can be organic and inorganic. CDD and CDF appear during the combustion of a fuel containing traces of chlorine, and as well during incineration of chemical or medical waste, and sewage sludge (USEPA 2000). These findings show that in fact any combustion process involving chlorine can be a source of CDD and CDF.

Due to their persistence in the environment, CDD and CDF can be present in practically all mediums: water, air, soil, sediment, animals and food. Their concentrations in air, water or soil range from parts per trillion (ppt; 1:10<sup>12</sup>) to parts per quadrillion (ppq; 1:10<sup>15</sup>). Such low concentrations but also extreme toxicity of CDD and CDF impose highly strict and complicated requirements for testing laboratories to monitor these compounds in the environment (Reed et al 1990). Typical CDD concentrations in air of the USA towns are about 2.3 pg/m<sup>3</sup>, in which octa- and heptachloro dibenzo-p-dioxins dominate (Smith et al. 1992). However, food intake is the most often source of CDD and CDF for those not occupationally exposed to these compounds. In this, meat, milk, fish and sea food account for about 90% of daily intake of CDD and CDF (USEPA 1999). As a rule, sports fishermen and those occupationally engaged in fishery consume large amounts of fish and on average they intake higher amounts of CDD and CDF. Particularly vulnerable part of the population are pregnant women, breastfeeding women and children. Others who can be exposed to the risk of increased intake of CDD and CDF are individuals living in contaminated areas or near industrial emitters of CDD and CDF and are engaged in agriculture and particularly cattle breeding. Such individuals who consume food of animal origin from own production could intake considerably higher CDD and CDF concentrations than the rest of the public (McLachlan et al. 1994).

Incineration of waste, including municipal waste, can be a source of CDD and CDF, so individuals professionally involved in such activities can be exposed to additional CDD and CDF amounts. On the other hand, modern incineration plants apply occupational safety measures and as well environmental protection measures, so there is a low probability of additional CDD and CDF emissions (Hattemer-Frey and Travis 1989). Occupational exposure is also observed in firefighters, workers that melt scrap metal and used iron, and in individuals engaged in the production or application of some pesticides (trichlorophenol, pentachlorophenol and hexachlorophenol) (Päpke et al. 1992).

Since the cigarette smoke can contain CDD and CDF, some relevant examinations have been conducted, establishing that additional daily intake of these substances corresponds to toxic equivalent (TEQ) of 18 pg/day for persons who smoke 20 cigarettes a day (Lofroth and Zebuhr 1992).

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#### Annex 11 d) – Exposure to polybrominated diphenyl ethers (PBDE), perfluorooctane sulfonates (PFOS) and hexabromobiphenyls (HBB)

PBDE compounds are used, among other things, as flame retardants. Compounds are lipid-soluble, and enriched in a food chain, particularly in fish liver. According to the assessment of the European Food Safety Agency (EFSA, 2011), fatty fish and fish fat are the most important sources of PBDE compounds among foods. House dust and occupational exposure are also important sources of exposure.

In experimental animals, PBDE compounds caused functional disorders of, e.g., liver, kidneys and nervous system, and as well hormone disorders and DNA damage, and they are also toxic to fetus (EFSA, 2011).

PBDE compounds are:

- flame retardants in plastics, used in the production of textile interior and electronic and electric devices;
- released to the environment during the use and processing of the above products;
- PBDE contamination sources include food and the environment. Among the foods, fish is the main source of PBDE (Frank Rahman et al. 2001.).

PFOS compounds are highly stable, almost undegradable, and thus bioaccumulating compounds. Unlike other accumulating compounds, they do not accumulate in fat tissue but in liver and plasma proteins. They disrupt the metabolism of thyroid hormones, liver and lipids, and as well lung development (Paul AG et al., 2009.).

As for PFOS compounds, the sources of exposure can be other meat products, food and the environment, besides fish itself (EFSA, 2008), but there are no any specific studies that analyze the presence of PFOS compounds in food in BiH to date.

PFOS compounds are:

- used as impregnation agents and stain repellents in packaging materials, textiles and paper products;
- used as ingredients in paints and lacquers;
- produced and widely used in Europe.

Hexabromobiphenyl belongs to the broad group of polybrominated biphenyls (PBBs).

One of the PBB products is used as flame retardant in three main commercial products (UNEP, 2012.):

- acrylonitrile butadiene styrene (ABS) thermoplastics for machine casings, such as for engines, and radio and TV parts
- as fire retardant in impregnating agents and lacquers, and
- in polyurethane foams for automotive seatings.

It has been proved that PBBs are resistant to field conditions. Soil samples from abandoned locations of production throughout the world have been analyzed in various studies several years after accidental releases, and it turned out that they still contain PBB (UNEP, 2012.). However, some congener compositions are different, and it is possible to find partially degraded PBB residues in soil samples. According to an EHC review (Effective Health Care program), additional researches in the 3-year period after the termination of PBB production

haven't shown a significant decrease in PBB level in river sediments. Laboratory researches showed that PBB mixtures seemed to be quite resistant to microbiological degradation (UNEP, 2012.).

PBBs are lipid-soluble and able to bioconcentrate in a food chain. The IARC classified hexabromobiphenyl as a possible carcinogen (IARC Group 2B). There is epidemiological evidence of hypothyroidism in workers exposed to a polybrominated biphenyl and increased incidence of breast cancer in exposed women (UNEP, 2012.).

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## Annex 12- Literature

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