Ministry of the Environment
of the Czech Republic

UPDATED NATIONAL IMPLEMENTATION PLAN

FOR IMPLEMENTATION OF STOCKHOLM CONVENTION ON PERSISTENT ORGANIC POLLUTANTS IN THE CZECH REPUBLIC

FOR THE PERIOD 2018-2023

March 2017

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March 2017
Ministry of the Environment
Prague
Czech Republic

Citation: Karel Bláha et al. (2017): Updated National Implementation Plan for implementation of Stockholm Convention on Persistent Organic Pollutants in the Czech Republic for the period 2018-2023, the Ministry of Environment, Prague, July 2017. Available online from:

https://www.mzp.cz/cz/strategicke_dokumenty_stockholmska_umluva,
http://www.recetox.muni.cz/nc/index.php?pg=cinnost--podpora-vykonu-statni-spravy,
https://www.databaze-strategie.cz/

Acknowledgements

This update of the National Implementation Plan for the implementation of the Stockholm Convention on Persistent Organic Pollutants in the Czech Republic for the years 2018-2023 was prepared by a wide team of authors, comprising people from the ministries, experts from academic fields, industry and NGOs as stated below. In addition, the electronic version of the update was available to the public for comments in the spring of 2017 and thus we would like to thank for all the suggestions and comments.

The authors also acknowledge the support that they received from the Research Centre for Toxic Compounds in the Environment (RECETOX), through the National Centre for toxic compounds and units of the Research Infrastructures RECETOX, namely from monitoring programs for incidence of persistent organic pollutants in the environment of the Czech Republic and analyses and visualizations of these data. The activities of RECETOX in this area are supported by the projects No. L01214 National Sustainability Program (NSP) of the Ministry of Education, Youth and Sports and No. LM2015051 "RECETOX Research Infrastructure (RI RECETOX)" within the framework of the Large infrastructure for research, development and innovation financed by the Ministry of Education, Youth and Sports of the Czech Republic.

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List of abbreviations

ADI	acceptable daily intake
AMAP	Arctic Monitoring and Assessment Program
AS	Academy of Sciences
BAT	Best Available Technology / Techniques
BEP	Best Available Practice
BFR	bromine flame retardants
BREF	Reference documents of the European Union on Best Available Technology, BAT Reference Documents
CAS	Chemical Abstracts Service
CENIA	Czech Environmental Information Agency
CLRTAP	Convention on Long-range Transboundary Air Pollution
COPx	Conference of the Parties No. x
CHMI	Czech Hydrometeorological Institute
CEI	Czech Environmental Inspectorate
WWTP	Wastewater Treatment Plant
DDT p, p‘ –DDT (4,4´-DDT)	1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane
DM	Dry Matter
E-PRTR	European Pollutant Releases and Transfer Register
EAP	Environment Action Program
EEA	European Environment Agency
UNECE	United Nations Economic Commission for Europe
EMAS	Eco-Management and Audit Scheme
EMEP	Cooperative program for monitoring and evaluation of the long range transmission of air pollutants in Europe, European Monitoring and Evaluation Program
EPS	Expanded polystyrene
EC	European Community
ETICS	external thermal insulation composite system
EU	The European Union
GACR	Grant Agency of the Czech Republic
GEF	Global Environment Fund
GENASIS	Global Environmnental Assessment and Information System
GEOSS	Global Earth Observation System of Systems
GMP	Global Monitoring Plan
DG FRS	Directorate General of Fire Brigade
HBCDD	Hexabromocyclododecane
HCB	hexachlorobenzene
HIPS	High Impact Polystyrene
IPEN	International POPs Elimination Network (an international network of non-governmental organizations working to promote the Stockholm Convention on Persistent Organic Pollutants)
IPPC	Integrated Pollution Prevention and Control
IPR	Integrated Pollution Register
AQIS	Air Quality Information System
ISPOP	An integrated system for the implementation of reporting obligations
Conference	Conference of the Parties of the Stockholm Convention
MoT	Ministry of Transport
MoF	Ministry of Finance
ICPE	International Commission for the Protection of the Elbe
MRD	Ministry for Regional Development
MD	Ministry of Defence
MONET_CZ	The monitoring network of persistent organic pollutants in the air of the Czech Republic by passive sampling method
MIT	Ministry of Industry and Trade
MLSA	Ministry of Labour and Social Affairs
MEYS	Ministry of Education, Youth and Sports
MU Brno	Masaryk University in Brno
MH	Ministry of Health
MA	Ministry of Agriculture
MFA	Ministry of Foreign Affairs
MoE	Ministry of the Environment

National Centre	National Centre for toxic compounds
NATO	North Atlantic Treaty Organization
NEK	environmental quality standard
NIP	National Implementation Plan for the Stockholm Convention
NOAEL	No Observed Adverse Effect Level
NPE	National Plan Environment
GR	Government Regulation
OCP	organochlorine pesticides
WEEE	Waste electrical and electronic equipment
OPE	Operational Program Environment
PAH	polycyclic aromatic hydrocarbons
PBDE	Brominated diphenyl ethers
PCB	Polychlorinated Biphenyls
PCDD/F	Polychlorinated dibenzo-p-dioxins and dibenzofurans
PCN	Polychlorinated naphthalenes
PeCB	pentachlorbenzene
PFC	polyfluorocarbons
PFOS, PFOA	Perfluorooctane sulfonic acid, perfluorooctanoic acid
Plan	National Implementation Plan for the Stockholm Convention
PM	Particulate matter
WMP	Waste Management Plan
POPRC	Persistent Organic Pollutants Review Committee
POPs	persistent organic pollutants
PVC	Polyvinylchloride
REACH	Registration, Evaluation, Authorization and Restriction of Chemicals (European Parliament and Council Regulation (EC) No. 1907/2006 of 18 December 2006 concerning the registration, evaluation, authorization and restriction of chemicals, establishing the European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93 and Commission Regulation (EC) No. 1488/94, as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC a 2000/21/EC).
RECETOX	Research Centre for Environmental Chemistry and Ecotoxicology
REZZO	Register of Emissions and Air Pollution
WFD	Water Framework Directive
RDC	Research and Development Council
SCRC	Stockholm Convention Regional Centre
CSDS	Contaminated Sites Monitoring System
SESEZ	System of registration of old environmental burdens
SISP04	Individual food consumption in the Czech Republic - a national study
ACI	Association of Chemical Industry in the Czech Republic
NIPH	National Institute of Public Health in Prague
TDI	tolerable daily intake
UIP	EU Implementation Plan
CISTA	Central Institute for Supervising and Testing in Agriculture
UNDP	United Nations Development Program
UNEP	United Nations Environment Program
UNIDO	United Nations Industrial Development Organization
IHIS	Institute of health information and statistics in the Czech Republic
R&D	Research and development
VŠB-VEC	Energy Research Centre, VSB - Technical University of Ostrava
ICT Prague	University of Chemistry and Technology, Prague
WHO	World Health Organization
XPS	Expanded polystyrene

Contents

1. INTRODUCTION

The National Implementation Plan for the implementation of the Stockholm Convention on Persistent Organic Pollutants in the Czech Republic (hereinafter the "Plan" or "NIP") is the main national strategic document that is regularly and compulsorily updated in relation to the fulfilment of the obligations set out in Article 7 of the Stockholm Convention on Persistent organic Pollutants (hereinafter the "Convention").
The Plan and its subsequent updates are designed to assess the situation at the national level for selected chemicals at any given time. It is used to evaluate the performance of existing action plans of the Czech Republic, to modify them or to set up other priority short and long term challenges arising from the introduction of new measures and procedures or in case they are needed in order to obtain the necessary information or knowledge about the occurrence, use and disposal of persistent organic pollutants (hereinafter "POPs") listed or newly listed in the Annexes of the Convention.
The aim of all the activities listed in the Plan is, as quickly as possible, to eliminate or reduce the negative impacts of POPs on human health and the environment in the Czech Republic (hereinafter "CR") and thus contribute to faster global achievement of the objectives of the Convention.
The contents of the Plan provides information on the current scope of the Convention, including basic information on individual POPs (Chapters 1, 2 and Annex) and describes the current status of addressing POPs in the Czech Republic (Chapter 2). Following the state of implementation of the objectives of the Convention in the Czech Republic, the Plan modifies the existing activities, excludes the completed activities, and presents action plans for substances, which have been newly listed in the Convention (Chapter 3). Each Plan also takes into account the discussion and outcomes prepared by the Review Committee for the evaluation of Persistent Organic Pollutants (scientific subsidiary body of the Convention, "the POPRC"). NIP structure is, to the greatest extent possible, based on the manuals and guidelines prepared and updated by the Secretariat of the Stockholm Convention in cooperation with international experts.
The draft of the Plan is prepared by the Ministry of the Environment under the direction of the national focal point of the Stockholm Convention with the support of experts from the National Centre for toxic compounds and interministerial Council of the National Centre for toxic compounds. The proposal is discussed with all stakeholders, including the public and the final version of the Plan is acknowledged by the Government of the Czech Republic. The English version of the Plan, including updates, is published on the website of the Convention (http://chm.pops.int/Implementation/NationalImplementationPlans/NIPTransmission/tabid/253/Default.aspx) and presented at the next Conference of the Parties. The Czech version is saved on the website of the Ministry of Environment, the National Centre for Toxic Substances and strategic documents on the website of the Czech Republic (https://www.mzp.cz/cz/strategicke_dokumenty_stockholmska_umluva, http://www.recetox.muni.cz/nc/index.php?pg=cinnost--podpora-vykonu-statni-spravy, https://www.databaze-strategie.cz/). So far, two documents are published on the internet, the original NIP (hereinafter "**NIP 2006"**) and its first update (hereinafter "**NIP 2012"**).

1.1. Updated National Implementation Plan

This document is already the third version of the NIP and it is used to evaluate the fulfilment of previous activities in connection with POPs in the Czech Republic and to present action plans for substances that were newly listed in the Stockholm Convention in 2013 and 2015 (hexabromocyclododecane, hexachlorobutadiene, polychlorinated naphthalenes, pentachlorophenol its salts and esters).
First/initial NIP from 2006 was focused mainly on 12 persistent organic pollutants, the so-called "dirty dozen", compounds that are listed in the Annexes of the Convention since its entry into force in 2004. This plan was made for the years 2006-2010.
NIP (2006) was acknowledged by the Government on 7 December 2005 by the Order No. 1572 and the information about its performance was taken into account by the Government Order No. 1307 of 19 October 2009. This resolution also instructed the Minister of the Environment to prepare the first update NIP for the future period. The preparation of an updated draft of NIP was commissioned to the interministerial advisory body of the Minister of the Environment - The Council of the National Centre for Persistent Organic Pollutants - with the support of the National Centre for persistent organic pollutants. The draft update was prepared for the period of 2010-2011 and submitted for discussion to all stakeholders at the beginning of 2012.
The first update of NIP for the Czech Republic for the years 2012-2017 (NIP 2012) was acknowledged by the Government Order No. 810 dated 8 November 2012. The document took into account, inter alia, the decision from the 4th and 5th Conference of the Parties of the Stockholm

Convention, which included new substances in the Convention in the years 2009 and 2011. Government order No. 810 also imposed an obligation to submit information to the Government on the implementation of this updated Plan by 30 September 2015. The government discussed the fulfilment of the Plan on 26 October 2015 and by the Government order No. 862 of 26 October 2015 imposed the obligation to submit a further update of the National Implementation Plan for the Czech Republic **by 31 July 2017.**

The preparation of the second update of the Plan was again entrusted to the interministerial group - the Council of the National Centre for Toxic Substances (hereinafter the "Council", the original Council of the National Centre for persistent organic pollutants) with the support from the National Centre for Toxic Substances (hereinafter the "National Centre", the original National Centre for Persistent Organic Pollutants). The Council discussed proposals for new activities and drafts of action plans for existing and new substances in the period of 2015-2016. The final version of the second update of NIP was prepared in February 2017 and then the document was also available for public comments in the spring of 2017.

The structure of the second update of NIP is simplified compared to previous versions, but again, as much as possible taking into account the recommendations from the instructions and guidelines for the preparation and updating of the NIP created by the Secretariat of the Stockholm Convention in cooperation with international experts.

1.2. The Stockholm Convention on POPs

The Stockholm Convention on Persistent Organic Pollutants is a global environmental treaty aimed at protecting human health and the environment from the harmful impacts of persistent organic pollutants (POPs). The contract was concluded in May 2001 under the auspices of the United Nations Environment Program (UNEP) and **entered into force on 17 May 2004.** In March 2017 there were 181 Parties to the Convention, including the Czech Republic. In the Czech language the Convention and its changes after ratification at national level are published in the Collection of International Treaties in the form of a notification of the Ministry of Foreign Affairs. The original text of the Convention was published as a notification No. 40/2006 of the International Treaty Coll., the adoption of Annex G was declared a No. 24/2007 of the International Treaty Coll., amended by No. 50/2010 of the International Treaty Coll., amendments adopted in 2009 as No. 90/2010 Coll., amendments adopted in 2011, are published as the notification No. 11/2013 International Treaty Coll., amendments adopted in 2013 as the notification No. 47/2015 International Treaty Coll., and amendments adopted in 2015 as the notification No. 62/2016 International Treaty Coll.

POPs are very harmful substances characterized by high toxicity, some of which are carcinogenic, mutagenic or teratogenic. These substances are capable of long-term persist in the environment - under normal conditions they are hardly degraded/decomposed (some even do not degrade at all), transmitted over long distances (water, air, organisms), and additionally accumulate/store in living organisms, which multiplies their negative effect. These substances are found and used in industry and agriculture, and often arise **unintentionally and may be unwanted products** e.g. combustion, or may be waste products of chemical production.

The Convention sets the basic principles of protection against these substances. **Limits/bans production** (intentional and unintentional), **use, import and export** of persistent organic pollutants listed in the Annexes. Sets out measures to reduce emissions of POPs, preventing the entry of new substances possessing properties of POPs into the environment by introduction of BAT/BEP practices (i.e. the implementation of best available techniques and best environmental practice) and for **wastes containing POPs indicates the obligation to dispose of them in an environmentally sound manner.** For developing countries, it provides technical and financial assistance in fulfilling obligations under the Convention. It imposes an obligation to report regularly on the production and use of POPs as well as the occurrence of monitored matrices in the environment (air, water and breast milk) and to prepare a plan to control POPs at the national level (National Implementation Plan). The Convention periodically assesses the effectiveness of its actions and has also set up a detailed mechanism and criteria in case of listing additional substances in the annexes. In the evaluation process the key role plays the supporting scientific body of the Convention, the **Persistent Organic Pollutants Review Committee (POPRC)**.

The list of the original 12 substances in the Convention is still expanding, depending on the decisions taken by the Conference of the Parties (hereinafter referred to as "COP" or the "Conference"). Table 1 shows the status of listed substances before the 8th Conference of the Parties (COP8 in 2017) and has been taken and completed from the former NIP (NIP 2012). More information on the substances listed until COP5 (2011), inclusive, are provided in the previous versions of the Plan (NIP 2006, NIP 2012). Information about the properties of substances that have been included in the Convention in 2013 (COP6) and 2015 (COP7), reflects this update of NIP, and are listed in the Annex. Newly listed substances at COP8, held in May 2017, will be subject to the following (third) update of the Plan.

For some substances included in the Convention in **Annexes A and B** the Parties are allowed to continue using them, or continue production in the range of **specific exemptions or acceptable purposes** specified in the relevant decisions in the event that the Party registers the exemption/purpose with the secretariat of the Stockholm Convention; unless of course the general validity of the exemption has been approved without the need for registration.
Specific exemptions for these chemicals are usually registered for a period of five years (may be extended under certain conditions) acceptable purposes are not limited in time, unless the Conference of the Parties decides otherwise.
Time necessity of exemptions is reviewed at regular intervals and may be terminated by the Conference decision. The overview of available specific exemptions and acceptable purposes is in Table 2, which is taken from the former NIP (NIP 2012) and supplemented by new substances. Further details of the exemptions are listed in the respective compounds in chapter *2.3. Assessment of POPs listed in Annexes A and B.*
Part II-VII of Annex A and Parts II and III of Annex B Convention, which are mentioned in Table 2, contain additional clarification or additional measures regarding the substance for which they are listed.

Table 1: Substances listed in the Annexes to the Stockholm Convention (until 2017)

Date of inclusion in the Convention Entry into force in general/ Entry into force for the EU and its Member States Total No of chemicals	Annex A substances intended to eliminate the use, production and trade ban	Annex B substances the production, use, import, export of which are limited	Annex C substances, which are subject to measures against their unintentional production
22.05.2001 17.05.2004/ 17.05.2004 **12 substances** ("Dirty Dozen")	aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), mirex, toxaphene polychlorinated biphenyls (PCB)	1,2-dichloro diphenyltrichlorethane (DDT)	hexachlorobenzene (HCB), polychlorinated biphenyls (PCB), polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF)
04.-08.05.2009 26.08.2010/ 26.08.2010 21 substances	α-hexachlorocyclohexane (α-HCH) β-hexachlorocyclohexane (β-HCH), chlordecone, hexabromobiphenyl (HBB), hexabromodiphenyl and heptabromodiphenyl ether (hexa-, heptaBDE), lindane (γ-HCH), pentachlorobenzene (PeCB), tetrabromodiphenyl and pentabromodiphenyl ether (tetra- pentaBDE)	Perfluorooctane sulfonic acid (PFOS), its salts and perfluoroctane sulfonyl fluoride (PFOS-F) (i.e. compounds based PFOS)	Pentachlorobenzene (PeCB)
25.-29.05.2011 27.10.2012/ 27.10.2012 22 substances	Technical endosulfan and its isomers		
28.04-10.05.2013 26.11.2014/ 26.04.2016 23 substances	Hexabromocyclododecane (HBCDD, HBCD)		
04.-15.05.2015 15.12.2016/ 15.12.2016 26 substances	pentachlorophenol and its salts esters, polychlorinated naphthalenes (PCN), hexachlorobutadiene (HCBD)		Polychlorinated naphthalenes (PCN)

Annex A, **part II** concerns PCB and states the obligation of the Parties, in particular to:

- Adopt provisions for eliminating the use of polychlorinated biphenyls in devices (for example in transformers, capacitors or other equipment containing liquid stocks) by 2025
- Promote measures to reduce danger, exposure and risk during the use of polychlorinated biphenyls
- Make provisions for the environmentally sound waste management of waste fluids and devices contaminated by polychlorinated biphenyls with a PCB content higher than 0.005 % as soon as possible, but not later than 2028
- Provide a report every five years on the progress in eliminating polychlorinated biphenyls and submit it to the Conference of the Parties.

Table 2: Possible exemptions to the ban on production and use of substances listed in Annex A or B

Chemical substance	Activity	Specific exemption / acceptable purpose
Aldrin No. CAS: 309-00-2	production	none
	use	none specific exemptions "Local ectoparasiticide, insecticide" finally expired in 2009
Chlordane No. CAS: 57-74-9	production	none specific exemption "as allowed for the Parties listed in the Register" finally expired in 2009
	use	none specific exemptions "Local ectoparasiticide, insecticide, termiticide, termiticide in buildings and dams, termiticide in roads, additive in plywood adhesives" finally expired in 2009
Dieldrin No. CAS: 60-57-1	production	none
	use	none specific exemption "in agricultural operations" finally expired in 2009
Endrin No. CAS: 72-20-8	production	none
	use	none
Heptachlor No. CAS: 76-44-8	production	none
	use	none specific exemptions "termiticide, termiticide in structures of houses termiticide (subterranean), wood treatment, for use in underground cable boxes" finally expired in 2009
Hexachlorobenzene No. CAS: 118-74-1	production	none specific exemption "allowed for the Parties listed in the Register" finally expired in 2009
	use	none specific exemptions "intermediate product, solvent in pesticide, intermediate product in a closed system, spatially bounded" finally expired in 2009. It is still possible to use as intermediates in a closed system, note. iii Part I of Annex A
Mirex No. CAS: 2385-85-5	production	none specific exemption "as allowed for the Parties listed in the Register" finally expired in 2009
	use	none specific exemption "termiticide" finally expired in 2009
Toxaphene No. CAS: 8001-35-2	production	none
	use	none
Polychlorinated biphenyls (PCB) No. CAS: Various	production	none
	use	Specific exemption: products used under the provisions of section II of this Annex (A)
DDT 1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane No. CAS: 50-29-3	production	Acceptable purpose: use for disease vector control in accordance with Part II of this Annex (B) specific exemptions "intermediate in production of dicofol, intermediate product" finally expired in 2009

	use	Acceptable purpose: disease vector control in accordance with Part II of this Annex (B) specific exemptions "production of dicofol, intermediate product" finally expired in 2009
Alpha hexachlorocyclohexane No. CAS: 319-84-6	production	none
	use	none
Beta hexachlorocyclohexane No. CAS: 319-85-7	production	none
	use	none
Chlordecone No. CAS: 143-50-0	production	none
	use	none
Hexabromobiphenyl No. CAS: 36355-01-8	production	none
	use	none
Hexabromodiphenyl ether and heptabromodiphenyl ether (The exact identification of the compounds is presented in Part III of Annex A, labelled "Definitions")	production	none
	use	Specific exemption: products in accordance with the provisions of Part IV of this Annex (A)
Lindane No. CAS: 58-89-9	production	none
	use	Specific exemption: Human health pharmaceutical for control of head lice and scabies as second line treatment
Tetrabromdiphenyl ether and pentabromodiphenyl ether (The exact identification of the compounds is presented in Part III of Annex A, labelled "Definitions")	production	none
	use	Specific exemption: products in accordance with the provisions of Part V of this Annex (A)
Pentachlorobenzene No. CAS: 608-93-5	production	none
	use	none
Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride No. CAS: 1763-23-1, 307-35-7 and more	production	Acceptable purpose: In accordance with Part III of this Annex for the production of other chemical compounds intended exclusively for the use stated below. Production for the following use. specific exemption: "as allowed for the Parties listed in the Register"
	use	Acceptable purposes: In accordance with part III of this Annex, for the subsequent acceptable purposes or as an intermediate product in the production of other chemicals to be used solely for the subsequent acceptable purposes. photographic imaging photoresist and anti-reflective coatings for semiconductors etchants used in semiconductor and ceramic filters hydraulic fluids for aviation plating (hard metal plating) only in closed system certain medical devices (such as ethylene tetrafluoroethylene copolymer (ETFE) layers and radio-contrast ETFE production, in vitro diagnostic medical devices, and CCD colour filters) extinguishing foam insect-ants baits of type Atta spp. and Acromyrmex spp. Specific exemptions: For the following specific uses, or as an intermediate in the production of chemicals with the following specific uses: photo masks in the semiconductor and liquid crystal display

		(LCD) industries plating (hard metal plating) plating (decorative plating) electrical and electronic components of some colour printers and colour copiers insecticides for control of red imported fire ants (Solenopsis invicta) and termites chemically driven oil production specific exemptions "carpets, leather and apparel, textiles and upholstery, paper and packaging, coatings and coating additives, rubber and plastics" finally expired in 2015
Technical endosulfan and its isomers No. CAS: 959-98-8, 33213-65-9, 115-29-7, 1031-07-8	production	Specific exemption: “as allowed for the Parties listed in the Register"
	use	Specific exemption: a group of pests bonded to a particular crop in accordance with the provisions of Section VI of this Annex (A)
Hexabromocyclododecane (The exact identification of the compounds is presented in Part III of Annex A, labelled "Definitions")	production	Specific exemption: as permitted by the Parties listed in the Register in accordance with the provisions of Part VII of this Annex (A)
	use	Specific exemption: expanded polystyrene and extruded polystyrene in buildings in accordance with the provisions of Part VII of this Annex (A)
Hexachlorobutadiene No. CAS: 87-68-3	production	none
	use	none
Pentachlorophenol and its salts and esters No. CAS: 87-86-5, 131-52-2, 27735-64-4, 3772-94-9, 1825-21-4	production	Specific exemption: as permitted by the Parties listed in the Register in accordance with the provisions of Part VIII of this Annex (A)
	use	Specific exemption: pentachlorophenol for poles and crossbeams in accordance with the provisions of Section VIII of this Annex (A)
Polychlorinated naphthalenes, including dichlorinated naphthalenes, trichlorinated naphthalenes, tetrachlorinated naphthalenes, pentachlorinated naphthalenes, hexachlorinated naphthalenes, heptachlorinated naphthalenes and octafluornaphtalene No. CAS: Various	production	Specific exemption: intermediates in the production of polyfluorinated naphthalenes, including octafluornaphtalene
	use	Specific exemption: the production of polyfluorinated naphthalenes, including octafluoronaphtalene

Part III refers to polybrominated diphenyl ethers and specifies which diphenylethers the Convention covers and provides definitions for these substances. **Part IV** and **Part V** are also dedicated to diphenylethers and determine the conditions for use for specific exemptions for these substances; Recycling of products, containing or potentially containing these substances, is permitted. Products made from such material can then be used, export of products is allowed only when the concentrations do not exceed the limits which the Parties have set for the presence of these substances in products used in their own territory. **Part VI** on endosulfan is specifying exemptions and provides a list of plants, and the bound pests against which it is possible to produce and use endosulfan.

Part VII is dedicated to hexabromocyclododecane and states the obligation of each Party, which registered a specific exemption for the production and use of hexabromocyclododecane for expanded polystyrene and extruded polystyrene in buildings, to take the necessary measures to ensure that the expanded polystyrene and extruded polystyrene containing hexabromocyclododecane can be easily identified throughout the life-cycle by labels or by other means. **Part VIII** on pentachlorophenol similarly indicates that each Party, which registered specific exemption for the production and use of pentachlorophenol for poles and crossbeams, take the necessary measures to ensure that the poles

and crossbeams containing pentachlorophenol can be easily identified throughout the life-cycle by labels or by other means. Subjects treated with pentachlorophenol should not be reused for purposes other than those that have an exemption.

Annex B, (restriction) **Part II** imposes for DDT series of other measures such as:

- Establishment of the DDT Register
- Use of DDT for disease vector control in accordance with the World Health Organization recommendations and guidelines
- Provision of information on use of DDT every three years by Parties
- Development of safe alternative chemical and non-chemical products.

Part III contains complementary measures to compounds based on PFOS and imposes on Parties registering specific exemptions/acceptable purposes, to gradually reduce the production and use of PFOS and indicates the obligation to report on the progress in reducing.

Similarly, the **Annex C** (Unintentional production) includes additional parts. In **Parts II and III** there are categories of sources, from which POPs listed in this Annex are released/may be released, in **part IV** there are general definitions and in **part V** there are general guidelines for Parties to implement best available techniques and best environmental practices (BAT/BEP); basic tools for the prevention and reduction of leakage of substances in this Annex – for more details also see chapter *2.4 Assessment of substances in Annex C.*

2. ASSESSMENT OF POPS IN THE CZECH REPUBLIC

An integral part of the national implementation plans should also be general information about the state for which they are created. However, because this information for the Czech Republic remain the same, it is possible to use the wording of chapter *2.1. Characteristics of State* - first NIP *(*2006). More information about institutional and political framework of the Czech Republic can be found in the text of chapter *2.2 Institutional, policy and legislative framework* the NIP of 2012 (specifically section 2.2.1 to 2.2.3). However, changes over time occured in the legislation and the following section summarizes the most important provisions in the Czech Republic in relation to POPs; as of+ March 2017. More information on the legislation at the EU level are also mentioned in EU implementation plan and its updates, which are published on the website of the Convention: http://chm.pops.int/Implementation/NationalImplementationPlans/NIPTransmission/tabid/253/Default.aspx.

2.1. Key legal regulations related to POPs - as of March 2017

The basic legal regulation in the area of POPs for the Czech Republic and other EU Member States is the European Parliament and Council Regulation (EC) No. 850/2004 of 29 April 2004 on persistent organic pollutants and amending the Directive No. 79/117/EEC (hereinafter "**Regulation on POPs "** or "Regulation (EC) No. 850/2004"), which is directly applicable in the Czech Republic and is superior to the original national provisions in this area. The Regulation (EC) No. 850/2004 includes the existing obligations of the two international agreements, the Stockholm Convention on Persistent Organic Pollutants and the Protocol on Persistent Organic Pollutants to the Convention on Long-range Transboundary Air Pollution (CLRTAP, 1998). Both Conventions addresses the issue of POPs relating to the environment but scope, lists and the methods of inclusion of substances in various instruments are not fully identical. The Stockholm Convention is a global treaty signed in the framework of the United Nations Environment Programme (UNEP) and covers issues of selected POPs in all components of the environment. CLRTAP applies only to the region subject to the European Economic Commission and the UNECE Protocol on POPs focuses only on the air. Anyway, a certain similarity of the Protocol on POPs and the Stockholm Convention is due to the fact that the Protocol, which was created earlier, was taken as the basis for the creation of the global Stockholm Convention. By 2016, inclusive, a number of amendments were adopted in Regulation on POPs, which take into account the inclusion of new substances to the Stockholm Convention and the Protocol on POPs. The amendments to Regulation on POPs are published on the website of the Ministry of the Environment: http://www.mzp.cz/cz/pravni_predpisy_chemicke_latky_2012 (in Czech). The identified changes in Annexes I and III to this regulation are newly listed substances, changes to Annex IV and V of "waste" annexes setting the limit concentrations, which are decisive for management of waste containing POPs.

Overall, however, the overarching regulation for the management of chemicals in the European Union is **REACH regulation** (Regulation (EC) No. 1907/2006 of the European Parliament and Council concerning the Registration, Evaluation, Authorization and Restriction of Chemicals, establishing a European Chemicals Agency and amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93, Commission Regulation (EC) No. 1488/94, Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC and 2000/21/EC) as later amended. The

second key regulation is then **CLP regulation** (European Parliament and Council Regulation (EC) No. 1272/2008 on classification, labelling and packaging of substances and mixtures, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No. 1907/2006), as amended. For substances which are identified as persistent, bio-accumulative and toxic (they have the so-called **PBT properties**) or very persistent and very bio-accumulative (**vPvB properties**) during the evaluation under REACH, this result also means restriction/ban of their production and marketing in the EU.
In the Czech Republic the essential tool in the field of chemicals is the **Act No. 350/2011 Coll.**, On chemical substances and mixtures and amendments of some acts (Chemical Act), as later amended, including the Decree No. 163/2012 Coll., On the principles of good laboratory practice and the Decree No. 61/2013 Coll., On the scope of information provided on chemical mixtures, which have certain hazardous properties, and detergents.

The thematic groups below provide further legislation that intervenes in addressing the issue of POPs the most.

Legislation aimed at pesticides and fertilizers
Act No. 326/2004 Coll., on phytosanitary care and amendments to some related acts in the wording of Act No. 626/2004 Coll., Act No. 131/2006 Coll., Act No. 249/2008 Coll., Act No. 102/2010 Coll., Act No. 245/2011 Coll., Act No. 199/2012 Coll., which came into effect on 31 May 2004
The following regulations implementing this act and concerning phytosanitary care preparations were issued:
Decree No. 327/2004 Coll., on the protection of bees, birds, aquatic organisms and other non-target organisms in the use of plant protection products and the **Decree No. 33/2012 Coll.,** amending the Decree No. 327/2004 Coll., on the protection of bees, birds, aquatic organisms and other non-target organisms in the use of plant protection products
Decree No. 32/2012 Coll., on preparations and other products for the protection of plants
Decree No. 206/2012 Coll., on professional qualification in the phytosanitary care sector
Act No. 156/1998 Coll., on fertilizers, supplementary soil substances, supplementary plant preparations and substrates and agrochemical testing of agricultural soils (Act on Fertilizers), in the wording of later regulations
The following regulations implementing this act, concerning fertilizers and sediments, were issued:
Decree No. 273/1998 Coll., on sampling and analysis of fertiliser samples
Decree No. 474/2000 Coll., laying down requirements for fertilisers
Decree No. 257/2009 Coll., on the usage of sediments on the field

Legislation on the prevention of major accidents
Act No. 224/2015 Coll. dated 12 August 2015 on the prevention of major accidents caused by dangerous chemicals or chemical mixtures and amending Act No. 634/2004 Coll., on administrative fees, as later amended (the Act on prevention of major accidents)
The implementing regulations for this Act:
Decree No. 227/2015 Coll., on particulars of safety documentation and extent of the information provided by processors of the report
Decree No. 228/2015 Coll., which designates the scope of the processing of public information, notifications on a major accident and final report of the incidence and consequences of a major accident
Decree No. 229/2015 Coll., on how to prepare the draft of the annual plan of inspections and formalities regarding the content of the information on the outcome of the inspection and the control report
Decree No. 225/2015 Coll., on determining the extent of security measures of physical protection of the building included in group A or group B
Decree No. 226/2015 Coll., on the principles for defining the zones of emergency planning and procedures for the definition and content requisites for the external emergency plan and its structure

Legislation in the field of air protection with the impact on emissions and monitoring of POPs
Act No. 201/2012 Coll., on protection of the air
Decree No. 415/2012 Coll., on the allowable level of pollution and its detection and implementation of certain other provisions of the Air Protection Act
Decree No. 330/2012 Coll., on how to assess and evaluate the level of contamination, the extent of informing the public about the level of pollution during smog episodes

Legislation aimed at agricultural land
Act No. 334/1992 Coll., on protection of agricultural land fund, as later amended

Decree No. 13/1994 Coll., setting forth some details on the protection of agricultural land and especially its amendment, the **Decree No. 153/2016 Coll.** laying down details of the protection of quality of agricultural land and amending the Decree No. 13/1994 Coll., setting forth the details on the protection of agricultural land, the Act No. 334/1992 Coll., on protection of agricultural land fund, as later amended by the Act No. 41/2015 Coll. The limit values are determined and already used as indicators for assessing soil. According to the aforementioned law these are at two levels: preventive limits of content of hazardous substances in agricultural soil ($mg.kg^{-1}$ DM) (for ΣPAH, ΣPCB, ΣDDT, HCB, HCH (Σ α + β + γ), PCDD/F, hydrocarbons C 10 - C 40), which constitute the upper limit of the content of hazardous substances and the indicator values of hazardous substances (for benzo(a)pyrene, Σ PAH, Σ PCB, Σ DDT, HCB, HCH (Σ α+β+γ), PCDD/F), above which there is a threat to food safety or animal feed, direct threat to the health of humans or animals in contact with soil and negative impact on the production function of agricultural land ($mg.kg^{-1}$ DM).
Decree No. 257/2009 Coll., on the usage of sediments on the field
Decree No. 48/2011 Coll., establishing classes of land protection
Act No. 167/2008 Coll., on the prevention and remedying of environmental damage and amendments to some acts
Government Regulation No. 295/2011 Coll., on the environmental damage risk assessment and detailed conditions of the financial security
Decree No. 17/2009 Coll., on the detection and remediation of environmental damage to soil
There is a direct link also with the Fertilizers Act referred to in section *Legislation aimed at pesticides and fertilizers* (see above).
Decree No. 275/1998 Coll., on agrochemical testing of agricultural soils and determination of the soil properties of forestland, in the wording of later regulations

Legislation aimed at water
Act No. 254/2001 Coll., on waters and amendments to some acts, as later amended, and its implementing regulations (Water Act)
Government Regulation No. 401/2015 Coll., on the indicators and values of permissible pollution of surface waters and waste waters, the requisites of a permit for discharging waste waters into surface waters and into sewer systems, and on sensitive areas, as later amended. Annex 6 provides a list of priority substances and priority hazardous substances, in which POPs are included (alachlor, brominated diphenyl ethers, chloralkanes 10-13 endosulfan, HCB, HCB, HCH, PeCBz, PCP, PAH, PFOS, dioxins and dioxin-like compounds, HBCDD, heptachlor). In case of exceeding environmental quality standards for these substances, it is necessary to introduce measures to reduce.
Government Regulation No. 57/2016 Coll., on the indicators and the level of acceptable pollution of waste water and on characteristics of the permit for discharge of wastewater into groundwater
Decree No. 252/2004 Coll., on laying down the health requirements on drinkable and warm water and the frequency and extent of inspections of drinkable water in the wording of Decree No. 187/2005 Coll.
Decree No. 450/2005 Coll., on essential elements of the use of harmful substances and essential elements of the emergency plan, the method and scope of accident reporting, their amelioration and elimination of their harmful effects
Decree No. 5/2011 Coll., defining groundwater zones and groundwater bodies, the method of groundwater status assessment and the requirements of groundwater status identification and assessment programmes, as later amended
Decree No. 24/2011 Coll., on the river basin management plans and plans for flood risk management, as later amended
Decree No. 98/2011 Coll., on the method of status assessment of surface water bodies, the method of assessment of ecological potential of heavily modified and artificial surface water bodies and the requirements of programmes of surface water status identification and assessment, as later amended
Government Regulation No. 262/2012 Coll., on the determination of vulnerable areas and the action programme, as later amended

Legislation on Waste Management
Management of waste containing POPs is provided by **the Act No. 185/2001 Coll.,** On waste and amendments of certain some other laws, as later amended.
Regarding the Waste Act a number of implementing regulations were adopted (listed are currently valid):
Act No. 477/2001 Coll., on packaging, as later amended
Government Regulation No. 352/2014 Coll., on the Waste Management Plan of the Czech Republic for 2015 - 2024
Decree No. 94/2016 Coll., on the evaluation of hazardous properties of wastes
Decree No. 93/2016 Coll., On Waste Catalogue
Decree No. 374/2008 Coll., concerning waste shipment and concerning amendment of Decree No. 381/2001 Coll., laying down the Catalogue of Wastes, the List of Hazardous Wastes and lists of

wastes and countries for the purposes of export, import and transit and the procedure for granting consent to export, import and transport wastes (the Catalogue of Wastes), as later amended
Decree No. 437/2016 Coll., On the conditions of use of treated sludge on agricultural land and amending Decree No. 383/2001 Coll., on details of waste management and amending Decree No. 341/2008 Coll., on details of management of biodegradable waste and amending Decree No. 294/2005 Coll., on conditions of depositing waste in landfills and its use on the surface of the ground and amendments to Decree No. 383/2001 Coll., on details of waste management (Decree on details of management of biologically degradable waste). Sets the limit (maximum) concentrations in sludge ($mg.kg^{-1}$ DM) for PAH (sum of anthracene, benzo (a) anthracene, benzo (b) fluoranthene, benzo (k) fluoranthene, benzo (a) pyrene, benzo (ghi) perylene, phenanthrene, fluoranthene, chrysene, indeno (1,2, 3-cd) pyrene, naphthalene and pyrene) at 10 $mg.kg^{-1}$ solids; PCB (sum of 7 congeners - 28 + 52 + 101 + 118 + 138 + 153 + 180) for 0.6 $mg.kg^{-1}$ DM.
Decree No. 383/2001 Coll., on the details of waste management, as later amended
Decree No. 384/2001 Coll., on management of polychlorinated biphenyls, polychlorinated terphenyls, monomethyl tetrachlorodiphenyl methane, monomethyl dichlorodiphenyl methane, monomethyl dibromodiphenyl methane and all mixtures containing any of these substances in concentrations greater than 50 $mg.kg^{-1}$ (on the management of PCB)
Decree No. 237/2002 Coll., on the details of the manner of take-back procedure of certain products
Decree No. 116/2002 Coll., on methods of marking returnable deposit packaging
Decree No. 641/2004 Coll., on the extent and manner of package registration and notification of data from this registry
Decree No. 294/2005 Coll., on the conditions of land filling and using wastes on the surface and amending Decree No. 383/2001 Coll., on details of waste management
Decree No. 352/2005 Coll., on particulars of handling Electrical and electronic equipment and waste electrical and electronic equipment and on the detailed conditions of financing their handling (Decree on handling electrical and electronic equipment and waste electrical and electronic equipment).
Decree No. 341/2008 Coll., concerning details on biowaste management and concerning amendment of Decree No. 294/2005 Coll., on the conditions of land filling and using wastes on the surface and amending Decree No. 383/2001 Coll., on details of waste management (Decree on details of handling biologically degradable wastes)
Decree No. 352/2008 Coll., on details of waste management of car wrecks, selected car wrecks, the method of maintaining their records and records of waste generated in facilities for the collection and processing of wrecked cars and the information system to monitor streams of selected car wrecks (on details of handling car wrecks).
Government Regulation No. 111/2002 Coll., laying down the amount of the deposit for selected kinds of returnable packaging for which a deposit is made
Decree No. 170/2010 Coll., on batteries and accumulators and amending Decree No. 383/2001 Coll., on details of waste management, as later amended
Legislation aimed at pesticides and fertilizers
Act No. 110/1997 Coll., on foodstuffs and tobacco products, in the wording of later regulations
Decree No. 305/2004 Coll., determining types of contaminating and toxic substances and their admissible levels in foodstuffs
Government Regulation No. 98/2005 Coll., which establishes the rapid alert system on the risk of danger to health from foods and feeds
Decree No. 381/2007 Coll., determining the maximum admissible residual levels of specific types of pesticides in foods and foodstuff raw material
Decree No. 4/2008 Coll., laying down the types and conditions for use of supplements and excipients in the manufacture of foodstuffs
Decree No. 225/2008 Coll., stipulating the requirements for food supplements and the fortification of food
Decree No. 235/2010 Coll. establishing the requirements for purity and identification of the additives
Decree No. 277/2010 Coll. repealing the Decree of the Ministry of Health No. 273/2000 Coll., laying down maximum permitted residues of veterinary drugs and biologically active substances used in animal production in foodstuffs and food raw materials, as later amended

Horizontal legislation
Act No. 76/2002 Coll., on integrated pollution prevention and control, on the integrated pollution registry and on amendments to certain acts (the Act on integrated prevention), as later amended.
Act No. 25/2008 Coll., on the Integrated Environmental Pollution Register and the Integrated System of Compliance with Reporting Duty in Environmental Areas, as later amended
Government Regulation No. 63/2003 Coll., on the means and extent of security for the information exchange system regarding the best available technique
Government Regulation No. 145/2008 Coll., laying down the list of pollutants and thresholds and data required for reporting to the Integrated Pollution Register, as later amended.

Decree No. 554/2002 Coll., which establishes the model for the application form for integrated authorization, its extent and method of completion
Act No. 100/2001 Coll., on environmental impact assessment and amending some related acts (Act on environmental impact assessment) as later amended.
Act No. 258/2000 Coll., on protection of public health and amending some related acts, as later amended
Government Regulation No. 361/2007 Coll., on the protection of employee health at the workplace, as later amended
Decree No. 432/2003 Coll., laying down conditions for assigning categories to individual jobs, limit values of indices from biological exposure tests, conditions for the sampling of biological materials for biological exposure tests and the particulars of the reports on work with asbestos and biological agents
Act No. 258/2000 Coll., on protection of public health and amending some related acts
Decree No. 6/2003 Coll., which determines hygienic limits of chemical, physical and biological characteristics for indoor residential rooms of some buildings
Decree No. 428/2004 Coll., on gaining of technical qualification for handling of dangerous chemical substances and chemical preparations, classified as highly toxic
Act No. 120/2002 Coll., the conditions for the placing of biocidal products and active substances on the market, as related regulations
Decree No. 343/2011 Coll., on the list of active substances
Act No. 167/2008 Coll., on the prevention and remedying of environmental damage and amendments to some acts
Government Regulation No. 295/2011 Coll., on the environmental damage risk assessment and detailed conditions of the financial security

2.2. The status of implementation of measures to POPs in the Czech Republic

Obligations that the Parties have to fulfil with respect to POPs, arise from the text of the Convention and the decisions adopted by the Conferences of the Parties of the Stockholm Convention (COP). Measures may be general, identical for all listed POPs. These include compliance with the rules of inventory management, waste management, reporting on POPs and prevention of releases into the environment or monitoring of POPs content in the prescribed environmental components.
Other measures for certain substances are based on the Annex, where they are listed (A or B or C, it is possible to include the substance in two annexes i.e. A and C or B and C). Simply said, the substances listed in Annex A are prohibited, substances in Annex B are subject to restrictions. For substances in Annexes A and B the production, use, export, import is prohibited/restricted. For substances listed in Annex C, i.e. substances not produced directly, but released into the environment by human activities e.g. by combustion, the main aim of the measures adopted is to minimize such releases or completely remove them.
Summary of POPs listed in Annexes A, B or C of the Stockholm Convention by 2017 is shown in Table 3, which also summarizes the situation around their production, use and origin in the CR.

2.3. Assessment of POPs listed in Annexes A and B

The Czech Republic has historical experience on the large POPs (particularly chlorinated) production from 1950s as well as consequences of the general use and industrial development on its territory on the state of the environment. Part of the POPs production has been phased out in 1970s or 1980s; and changes in 1990 on political and legislative level, brought further significant decrease in POPs releases into the environment, in particular from industrial sources. Stricter limits in the legislation may of the original entries of pollutants into environment were stopped or reduced. Non-industrial sources also reduce their POPs releases, but significantly slower. Remediation of old environmental burdens and contaminated sites has started after 1990, with a design and operation of large and very costly measures (NIP 2012).
The following text reviews the current national situation for the POPs listed in Annexes A and B to 2017, particularly with regard to the commitments to ban/restrict production and use resulting from the listing in the annexes and the specific issues that are addressed in relation to particular substance in the Czech Republic.
POPs listed in Annexes A and B are prohibited from manufacture and use, except to the extent allowed by the specific exemptions and acceptable purposes. If a Party wants to use specific exemptions or acceptable purposes, it must register them (unless it is approved that the registration is not required) before the particular amendment of the Convention comes into force for that Party. States which register exemptions or acceptable purposes are included on the lists (registers) on the website of the Convention.

CR (resp. EU) has so far registered for specific exemptions for brominated diphenyl ethers (tetra- to heptaBDE) and acceptable purposes for compound based on PFOS. For newly classified substances from the years 2013 and 2015 EU/Czech Republic registered a specific exemption for HBCDD.
Specific exemption for PBDE permits in the Czech Republic recycling plastics that contain or potentially contain these substances. Specific exemption for HBCDD allows the production of this compound for use in polystyrene and its use in polystyrene, which is used for the insulation of buildings (the so-called EPS, see chapter *2.5. Basic inventory and evaluation of the newly classified substances (HBCDD, PCN, HCB, PCP) in the Czech Republic*). Regarding this exemption the legislation in the CR (resp. EU) is stricter compared to that of the Convention. For the EU states, its validity will be terminated sooner, before the year 2019 (2019 is the year when its validity generally ends under the Convention, unless the Conference decides otherwise). More information on registered exemptions/purposes for particular chemical is listed in the following chapters.
The registration of a specific exemption or acceptable purpose for the Party imposes an obligation to search for and adopt national measures that reduce or eliminate the need for such exemption. The ending the need to use the exemption may be notified in writing at any time to the Secretariat of the Convention and then that Party is withdrawn from the relevant register.
The following text (until subchapter 2.5.) evaluates the situation in the Czech Republic for POPs that were included in the Convention before COP6 (2013). As mentioned in the previous text, the basic inventory and detailed information on the properties and appearance of these "old" POPs are found in former versions of NIP (NIP 2006, NIP 2012).

Table 3: Production, use, unintentional production/origin POPs CR

Substance	Purpose/origin	Production	Use	Note:
Aldrin	pesticide	No	none or minimum (banned in 1980)	Registration 1962 - 1963
1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane (DDT) and its metabolites	pesticide	Yes	Yes, until 1974, when it was officially banned. Complete cessation of use only in the years 1978 - 1983.	Registration 1958 - 1973 (various products)
Dieldrin	pesticide	No	Yes, until 1969 (officially banned)	Registration 1960 - 1968
Endrin	pesticide	No	Yes, until 1984, when it was officially banned.	Registration 1960 - 1983
Heptachlor	pesticide	No	Yes, until 1986, when it was officially banned.	Registration 1970 - 1985
Hexachlorobenzene	pesticides, industrial chemical, by-product	Yes, until 1968, Spolana	Yes, until 1977, when it was officially banned.	HCB is an unintentional by-product of chlorinated hydrocarbons
Chlordane	pesticide	No	No	
Lindane/ hexachlorcyclohexane	pesticide, by-product	Yes (until 1977)	Yes, at least until 1975 (officially banned since 2010)	Registration 1952 - 1970, from 1956 only lindane was used and only in forestry
Mirex	pesticide	No	No	
Toxaphene	pesticide	No	Yes, until 1986 (officially banned in 1984).	Registration 1958 - 1983
Polychlorinated Biphenyls	industrial chemical, by-product	Yes, in the years 1959 - 1984	Yes	For details see chapter 2.3.2. hereof
Polychlorinated dibenzo-p-dioxins and dibenzofurans	by-product	-	-	Unintentional production only

Substance	Purpose/origin	Production	Use	Note:
				– combustion processes.
Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS-F) (col. PFOS)	industrial chemical	No	Yes	For details see chapter 2.3.2. hereof
Hexabromodiphenyl ether and heptabromodiphenyl ether	industrial chemical	No	Yes	For details see chapter 2.3.2. hereof
Tetrabromdiphenyl ether and pentabromodiphenyl ether	industrial chemical	No	Yes	For details see chapter 2.3.2. hereof
Chlordecone	pesticide	No	No	
Hexabromobiphenyl	industrial chemical	No	No	
Pentachlorobenzene	pesticide, industrial chemical, by-product	No	Yes	It is generated as inevitable but unintentional by-product when producing chlorinated hydrocarbons.
Technical endosulfan and its salts	pesticide	No	Yes	It had been used as insecticide and to protect wood.
Hexabromocyclododecane	industrial chemical	No	Yes	For details see chapter 2.5 hereof
Pentachlorophenol its salts and esters	pesticide	Yes	Yes, probably until 90s of the 20th century.	For details see chapter 2.5 hereof
Polychlorinated naphthalenes	industrial chemical, by-product	No	No or at least	For details see chapter 2.5 hereof
Hexachlorobutadiene	industrial chemical, by-product (in Annex C listed in 2017)	No	No or at least	For details see chapter 2.5 hereof

This update is already targeted only on ongoing problems with these old POPs. The evaluation and basic inventory of substances listed in the Convention in the years 2013 and 2015 are then presented in a separate chapter *2.5 Basic inventory and evaluation of the newly classified substances (HBCDD, PCN, HCB, PCP)*.

2.3.1. Assessment of Pesticides in Annex A

Pesticides listed in the years 2004, 2009 and 2011, i.e. aldrin, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), pentachlorobenzene (PeCB), chlordane, chlordecone, mirex, toxaphene, three isomers of HCH and endosulfan. HCB and PeCB are simultaneously industrial chemicals and also arise unintentionally; they are included in Annex C.

For these pesticides the term obsolete organochlorine pesticides (OCP) is used, and as shown in Table 2 of this document, some in the Czech Republic were not used at all, or their production and use in the Czech Republic ended many years ago. In relation to the OCP in the Czech Republic there were/are activities addressed that are associated primarily with ensuring the proper disposal of unused

stocks, respectively waste and addressing sites contaminated by these compounds. Disposal of unused stocks was carried out in the early 90s of the last century (carried out by the Ministry of Agriculture, MA), where most (but not all) of stocks were burned. MA completed the identification and remediation of sites contaminated with obsolete pesticides on January 1, 2011.
Due to the earlier long-term production and use, and due to the persistence of the OCP in environmental components they are still detected in the Czech Republic and for certain substances the dietary exposure is monitored and evaluated. The evaluation is carried out regularly (since 1994) and the reports are available in the yearbooks of the National Institute of Public Health. The extent of exposure of the Czech population estimated according to actual consumption of food (SISP04) reached a low exposure doses - e.g. less than 0.1% of the tolerable intake (TDI) for the sum of DDT, less than 0.1% of the acceptable daily intake (ADI) for lindane, 0.3 % of the tolerable intake (TDI) for hexachlorobenzene. The results confirm the persistent contamination of food by these POPs, but at low concentrations, which according to current knowledge, do not pose a significant health risk if they are assessed as individual chemicals and not in mixtures (http://www.szu.cz/uploads/documents/chzp/odborne_zpravy/OZ_15/Odborna_dieta_2015.pdf).
More information on monitoring of OCP in the environment of the Czech Republic are set out in chapter *2.10. Technical infrastructure for POPs assessment*. For more information on substances and problems of obsolete pesticides in the Czech Republic it is possible to use the first NIP 2006 (*2.3.1 Evaluation of Chemicals under Annex A Part I (POPs pesticides): historical, current and planned production, use, import and export*. *Existing policy and legislative framework),* further details see also in *Annex No. 2* (NIP 2006) and also *Annex 1 P.1.8- P. 1.11* in NIP 2012.

Conclusions
The issue of sites contaminated by POPs is discussed in detail in a separate text of chapter *2.7 Identification of contaminated sites*, which also deals with the solutions for the remaining "discovered stocks" or illegal landfills of OCP; they are presently dealt with case by case and the existing financial instruments for elimination are listed at the end of the particular chapter. The results of monitoring the public health confirm the persistent global contamination of food, but at low concentrations, which according to current knowledge, do not pose a significant health risk if they are assessed as individual chemicals and not in mixtures. Checking the OCP content in foods should be maintained for imports and also random checks for domestic food (especially of animal origin).

2.3.2. Assesment of industrial chemicals in Annex A

Industrial substances listed in the years 2004, 2009 and 2011, i.e. Hexabromobiphenyl (HBB), polychlorinated biphenyls (PCB), brominated diphenyl ethers (tetra to heptaBDE), hexachlorobenzene (HCB), pentachlorobenzene (PeCB). HCB and PeCB are simultaneously also pesticides. PCB, HCB and PeCB are listed additionally in Annex C. For further information on measures against substances under Annex C, see chapter *2.4 Assessment of substances in Annex C.*

Hexabromobiphenyl, pentachlorobenzene, hexachlorobenzene
Of these three compounds only HCB was deliberately manufactured and used in the Czech Republic. However HCB and PeCB are still unintentionally originated in the CR as by-products in the production of chlorinated compounds. A certain occurrence can be recorded also for HBB compound in waste, but it is assumed to be minimal.

Conclusions
These substances are not produced and not used in the Czech Republic. Their unintentional production is addressed in chapter *2.4. Assessment of substances in Annex C.*

Polychlorinated Biphenyls
Annex A Part II provides a general procedure for the elimination of the use of PCB equipment; use of all equipment containing PCB must be terminated no later than by 2025, liquid waste containing PCB and equipment contaminated with PCB at a concentration of 0.005% must be disposed of in an environmentally sound manner by 2028.
CR has a rich recent history of the use and production of PCB, compounds were prohibited only in 1984. PCB were used in the so-called closed (transformers, capacitors) and open (paints, sealants, approximately 21% of the total use) applications. Detailed information about the history of the production, use and properties of substances can be found in Chapter *2.3.2 Evaluation for Chemicals under Annex A, Part II Chemicals (PCB)* in the original NIP (2006). Due to the wide use of PCB in the Czech Republic, there are relatively high levels, which are still detected in the environment and in human matrices. The studies of WHO, in which the CR participated; imply that the concentration of the sum of 6 indicators PCB in a mixed sample of breast milk from the CR was the highest

(UNEP/POPS/COP.6/INF/33). In 2015, this concentration was 158 ± 26 ng/g of fat (for a comparison, in the Netherlands this concentration was 40.1 ng/g of fat).
The long term comparison of exposure doses to the sum of 7 congeners PCB has a slightly decreasing trend in the CR. The comparison was performed using a model of recommended food rations. Figure 1 implies clearly that there are about 3x higher burden in children where food consumption per kg of body weight is higher. The average exposure dose for them theoretically ranges between about 3.5% TDI, while in other population in the CR this level is 1% TDI. PCB residues were found in fish and fish products, lard and fat dairy products (in the last observation of exposure in 2014-15, PCB congeners were detected in 149 out of 220 samples). Higher exposure doses can be expected particularly for population with higher intake of fat of animal origin.
(http://www.szu.cz/uploads/documents/chzp/odborne_zpravy/OZ_15/Odborna_dieta_2015.pdf).
More detailed information on the monitoring of PCB then listed in subsection 2.*10. Technical infrastructure for POPs assessment*.
Sites contaminated with PCB, decontamination and termination of use of equipment in which PCB are present, and the risks arising from open applications are current issues that have been and are still being dealt with in the Czech Republic in connection with the PCB. Decontamination and termination of use of PCB equipment in the Czech Republic as an EU member state is governed by the Council Directive 59/1996/EC[1], which was implemented in the Waste Act[2]. According to this law PCB owners and owners of PCB wastes had to dispose of them and by the end of 2010, it was necessary to perform a decontamination or removal of a device with a liquid volume with a PCB larger than 5 litres, except for transformers containing PCB or PCT in an amount from 0.05 % to 0.005 % by weight, and slightly contaminated with the content of 50 to 500 mg/kg of PCB in the operating fluids. According to the Waste Act, a database of equipment containing PCB was created and it is managed by CENIA, which receives and processes reports in this area.
As at September 2016 in the Czech Republic from the device over 5 litres remains 851 such transformers with PCB 116.574 t. Of these 851 devices, for 229 it is assumed to contain PCB in a total amount of 97,554 tons. Transformers containing more than 0.05 % of weight of PCB or PCT in the CR were decontaminated in accordance with the conditions specified in this legislation. Number of large facilities, where it is reasonable to assume that the fluids contain between 0.05 % and 0.005 % by weight of PCB (i.e. PCB contamination <0.05 %) in the CR on January 1, 2016 is 3470 with 1011.822 t liquid PCB. There are 2254 devices with PCB volume below 5 litres with 14,355 t of liquid with PCB.
With regard to contaminated sites registered by January 2017 in the database CSDS there are 397 contaminated or potentially contaminated sites, for more information see chapter *2.7. Identification of contaminated sites*.
Another problem associated with PCB is their earlier use in open applications (coatings, sealants), used both indoors and outdoors. For example, a number of steel structures is treated with a coating with PCB, including metal doors, balconies and boats. In connection with coating of steel structures containing PCB the problem of contamination of the river Elbe was resolved in the years 2015-17 by CEI after the removal of old paint containing PCB from a bridge by sandblasting. The topic of contamination of the Elbe has been discussed within the International Commission for the Protection of the Elbe (hereinafter referred to as "ICPE"). ICPE working group then developed the material called "Prevention and protection against entry of PCB and other pollutants from old paints to watercourses in the international Elbe River Basin" (available at http://www.ikse-mkol.org/cz/aktuelles/prevence-a-ochrana-pred-vnosem-pcb-a-jinych-znecistujicich-latek/).
Although it is a material developed within the ICPE and therefore applies for the international Elbe Basin, the principles set out therein are recommended by MoE in the whole CR and for all structures treated with PCB coatings for the purpose of prevention of similar cases in the future.
The limitation of PCB release from scrap processing is addressed in the relevant BREF (reference document on Best Available Techniques (BAT) for the iron and steel production, according to Directive 2010/75/EU on industrial emissions[3]), because in case of processing of scrap contaminated with paints, plastics, lubricants or other organic compounds in electric arc furnaces, there is a release not only of the PCB, but other aromatic organohalogen compounds (e.g. PCDD/F, chlorobenzene, PAH) as a result of incomplete combustion.

[1] Council Directive 59/1996/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)
[2] Act No. 185/2001 Coll., On waste and amendments of some laws (Waste Act)
[3] European Parliament and Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

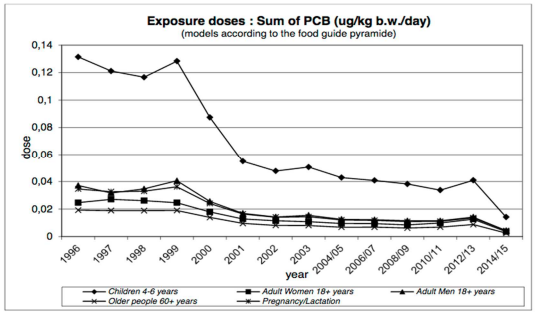


Chart 1: Downward trend in the incidence of PCB in the Czech population between the years 1996-2015, taken from
http://www.szu.cz/uploads/documents/chzp/odborne_zpravy/OZ_15/Odborna_dieta_2015.pdf

Conclusions

The Czech Republic fulfils its commitments to the Council Directive 96/59/EC[4]. Due to historical production and earlier widespread use of PCB in the Czech Republic (even in open applications), however, it is still necessary to pay attention to issues associated with PCB. While no increased incidence of PCB as a result of recent applications in public buildings has been yet recorded, for instance, the possibility of contamination of the environment due to the elimination of open applications remains. The contamination of the human population in the Czech Republic is among the highest in Europe, despite a significant downward trend. The most important source of human exposure includes food of animal origin. Reducing the consumption of animal fats can significantly help reduce the exposure dose. In relation to population exposure to PCB it is therefore advised to continue the thorough inspection of foods, especially those high in animal fat and promote reducing consumption of animal fats in the population.

Tetra-, penta-, hexa-, heptabromodiphenyl ethers

Tetra-, penta, hexa and heptabromodiphenyl ethers (PBDE) have been listed in the Convention by decisions SC-4/17 and 4/18 in 2009, the same specific exemption for all. For these compounds Parties were given an opportunity to recycle the products, respectively plastics containing or potentially containing these substances, not more than by 2030. The exemption is subject to reassessment by the Conference of the Parties.

Results of reassessment turned in the approval of a series of decisions. The necessity of separation of products with PBDE before their recycling and separation of plastics not only for domestic use but also for the granules, which are exported, the ban on the export of such waste for purposes other than environment friendly disposal are the main recommendations set out in the decision SC-5/5. Decisions taken at COP6 and COP7 then approved questionnaires for the provision of information to evaluate the situation with PBDE and have set another plan for reviewing by the Conference (COP8 and then every second). The Conference of the Parties may thus finally come to the decision on early termination of recycling plastics with PBDE, before 2030. The scientific support in assessing the situation and the necessary steps for the elimination of PBDE is likewise provided by POPRC.

In connection with these substances, the main task is to prevent that due to the plastics recycling they return back to circulation. The exemption under the Convention is registered in all EU countries and is implemented also in Regulation (EC) No. 850/2004 (the Regulation on POPs). In the EU, next to possibility to recycle plastics containing them, this regulation limits concentration of PBDE content for the end products. Regulation on POPs also sets the limit for the waste management (i.e. limits for low and high PBDE content).

Concentrations of PBDE in products can be for all tetraBDE max 10 mg/kg (0.001% by weight), the same applies for the sum of pentaBDE, hexaBDE and heptaBDE; if all four groups of congeners were present in the product, then the unintended amounts (i.e. meant as impurities) may reach a maximum of 40 mg/kg. However, there is an exemption for the content of these compounds in products derived from partially or completely of recycled materials or from waste prepared for re-use. In such products, the concentration may be up to 0.1% by weight for each group of congeners (max. 4000 mg/kg for all four groups). In addition, for plastics in electrical and electronic equipment the Directive 2011/65/EU[5]

[4] Council Directive 96/59/EC of 16 September 1996 on the disposal of polychlorinated biphenyls and polychlorinated terphenyls (PCB/PCT)

[5] European Parliament and Council Directive 2011/65/EU of 8 June 2011 on the restriction of the use of certain hazardous substances in electrical and electronic equipment

applies, which sets in Annex II the maximum value of the mass concentration of PBDE tolerated in homogeneous materials at 0.1 %.

PBDE content in waste covers regulation of POPs, which gives a value for low content of PBDE at 1000 mg/kg (for the sum of tetra- to heptaBDE). Up to this content, the waste is treated as household waste, but when this value is exceeded, the waste must be treated as waste containing POPs and PBDE must be irreversibly destroyed (waste management methods D9, D10, R1, see note in Table 7). The limit for the high PBDE content is set at 10,000 mg/kg (amount of tetra- to heptaBDE), and up to this concentration, it is possible to treat the waste and so that PBDE is not irreversibly destroyed in the event that for some reason it is not possible and it is proceed in accordance with Article 7, para. 4(b) of the regulation on POPs. At concentrations above 10,000 mg per 1 kg of waste PBDE this option is not available.

Processors of electrical and electronic equipment are subject to the WEEE Directive[6], obliged to first disassemble plastics containing PBDE from electrical and electronic. However, the CR legislation does not provide special rules or special requirements for disposal of such waste. At the level of European platform WEELEBEX (http://www.weeelabex.org/) certain standards are applied. These procedures are introduced by processors who are certified by WEELEBEX. In the Czech Republic there are currently a total of 5 certified processors of electronic waste, which apply to the given procedures. These processors are obliged either to separate plastics (such as on the dry basis by lasers detecting bromine, or on the wet basis by weight, as bromide is relatively heavy) or demonstrate that these substances will not be further recycled (within the customer contracts).

According to the information available in the Czech Republic recycled material that contains or may potentially contain PBDE is not used for further processing, mainly for the reason that there is not even any demand for recycled plastics in which the presence of PBDE can be expected (plastics from electrical and electronic equipment and polyurethane foam cars). In the Czech Republic the listed plastics are mainly processed into granules, which are also exported mainly to China. To the Czech Republic waste plastics are also imported and "reworked" and again exported as granules. Information on the composition of exported granules is usually missing. Technological processes of direct separation of PBDE are very costly.

Conclusions

There is no re-use of recycled plastics containing PBDE in the Czech Republic, mainly because there is no demand for such material. The waste plastic is largely exported; the quantity of PBDE in this material is usually not monitored. It can be assumed that the proportion of tetra and pentaBDE in exported granules may be increased due to plastic components of older used cars, which are imported to the Czech Republic and later disposed of, or possibly cars with these components are further exported. It is necessary to increase review with respect to the allowable amount of PBDE in exported products and wastes as well as in imported products, especially those that are intended for contact with food, water and products for children.

2.3.3. Assessment of Pesticides in Annex B

Annex B identifies one pesticide DDT. DDT belongs to the original 12 POPs by the Convention. In Annex B, Part II there are detailed measures that the Parties have to implement against this substance.

This substance may be used or produced only by Parties listed in the DDT Register. EU Member States did not register the use/production of DDT and do not use or produce this compound. The situation in the Czech Republic is summarized in Table 2. More details on this issue can be found in the wording of the original NIP from 2006, chapter *2.3.3. Evaluation of chemical substances in Annex B (DDT)*.

Conclusions

In the Czech Republic measures against DDT fall under other obsolete chlorinated pesticides and are related to the elimination of the remaining waste and remediation of contaminated sites. This theme is further described in chapter *2.7 Identification of contaminated sites*. Information on exposure of the population can be found in chapter *2.3.1. Assessment of Pesticides in Annex A* above.

2.3.4. Assessment of industrial substances in Annex B

Annex B lists one industrial chemical, or a group of substances: PFOS, its salts and PFOSF. These compounds were incorporated into the Convention in 2009, with specific exemptions (some of which have expired), and acceptable purposes (summarized in Table 2).

[6] EP and Council Directive 2012/19/EU on waste electrical and electronic equipment

In the Czech Republic these substances have never been produced and are not produced, but have been and are used. At present, however, these compounds may be used only within the registered range of acceptable purposes. For more information on the properties, occurrence in the environment and the origin of these compounds, see chapter *2.3.6. Assessment of Pesticides in chemical substances included in Annex B, Part III (PFOA, PFOS and its salts)* (NIP 2012).
Czech Republic registered in 2010 for use of PFOS two special exemptions "plating (hard metal plating) and plating (soft plating)." The validity of these two exemptions ended on 26 August 2015, which is also in accordance with the Regulation on POPs, where exemptions were listed as "wetting agents for use in controlled electroplating systems". CR has registered only acceptable purposes: photographic imaging, photoresistent and anti-reflective coatings for semiconductors, aviation hydraulic fluids and plating (hard metal plating) only in a closed system; respectively in the regulation on POPs these are listed as exemptions "b) photoresistent or anti-reflective coatings for photolithography processes; c) photographic coatings applied to films, papers or printing plates; d) mist suppressants for non-decorative hard chrome plating (VI) in closed systems; e) hydraulic fluids for aviation. Acceptable purposes are not time-limited, but the Parties have an obligation to reconsider their use for the purpose of their final elimination, and gradually reduce the need for an acceptable purpose by finding and implementing alternatives. Parties shall submit progress reports on the elimination every four years and submit annual statistical estimation of their consumption.
According to the Czech Airlines Technics, a.s. no such substances which they use contain hydraulic fluids. Possibility to terminate this purpose, the use of PFOS is declared by the entire EU and it is expected to be so for the Member States by 2018 at the latest.
The need for exemptions for the use of PFOS as a wetting agent for chrome coating still persists in the Czech Republic. Finding a suitable replacement is difficult due to the fact that chrome-plating bath is very aggressive (70 °C, pH about 3, hexavalent Cr). The existing information on the extent of use of the exemption for photolithography shows that this exemption is not used in the Czech Republic. For the entire EU any similar conclusion has not been made yet. The exemption for the photographic industry in the Czech Republic is used by one company, the PFOS consumption is in the range of several tens kg/year. This single operation assumes the termination of the use of PFOS in 2017. At the EU level the validity will be terminated also no later than in 2018.
Limiting the number of acceptable purposes for PFOS and its compounds can be taken into account already in the so-called Recast of the Regulation (EC) No. 850/2004, which should be discussed at the beginning of 2017.
PFOS compounds in the CR are monitored (see chapter *2.10. Technical infrastructure for POPs assessment*), the information on releases of PFOS compounds into the environment and their origin in the Czech Republic is missing (not in the IPR register).
Due to the hydrophilic nature of PFOS compounds, based on a decision of the Parties SC 5/18, 6/23, 7/25 surface water was recommended to be among the matrices to be monitored. In the Czech Republic PFOS in surface water is monitored in the assessment of ecological status under the Water Framework Directive[7]. As an indicator for the ecological assessment of the situation, the substance was determined in 2011 by an amendment of the Government Regulation No. 61/2003 Coll.[8]
Based on the requirements of Directive 2013/39/EU[9], which defines PFOS as a priority hazardous substance, its monitoring is included in the national river basin management plans within the so-called third planning cycle as one of the parameters of chemical status assessment. Individual companies in the basin transmit data to the Hydrometeorological Institute, which is centrally managed (for details see the document "Concept of POPs monitoring in the Czech Republic": http://www.mzp.cz/cz/strategicke_dokumenty_stockholmska_umluva). The Conference also recommends monitoring in waste waters and possibly developing (or implementing) technologies that will be able to capture these substances in wastewater treatment. In the Czech Republic the implementation of measures to prevent leakage into the water is treated (Government Regulation No. 401/2015 Coll.[10]). However, the entry of these substances into soil by application of sludge is not controlled, while no limits are set on the content of these materials for sludge applied to farmland.

[7] European Parliament and Council Directive 2000/60/EC of 23 October 2000 establishing a framework for Community action in the field of water policy (Water Framework Directive - WFD)
[8] Government Regulation No. 61/2003 Coll., on the indicators and values of permissible pollution of surface waters and waste waters, the requisites of a permit for discharging waste waters into surface waters and into sewer systems, and on sensitive areas. (Government Regulation No. 23/2011 Coll.); now Government Regulation No. 401/2015 Coll.
[9] European Parliament and Council Directive 2013/39/EU of 12 August 2013 amending Directive 2000/60/EC and 2008/105/EC as regards priority substances in the field of water policy
[10] Government Regulation No. 401/2015 Coll., on the indicators and values of permissible pollution of surface waters and waste waters, the requisites of a permit for discharging waste waters into surface waters and into sewer systems, and on sensitive areas. Replaced the Government Regulation No. 61/2003 Coll. as amended by the Government Regulation No. 23/2011 Coll.

PFOS in sludge are monitored by CISTA from 2013 (more in chapter *2.10. Technical infrastructure for POPs assessment*).
Stocks of PFOS substances in the Czech Republic have not been identified. Although the Union Implementation Plan states that it can be expected mainly in the photographic industry; in the Czech Republic the PFOS compounds are used only by one factory, which assumes that it will be consumed by 2018. Potential unused stocks of fire-fighting equipment/fillings with PFOS compounds, according to the available information (information of DG FRS) do not apply to the Czech Republic. Using fire extinguishers containing PFOS in the Czech Republic was minimal and the proportion of foam devices on the market in the country is small. In the past, devices used foam from only one company (Kovoslužba of Praha s.o.), which did not use PFOS. PFOS were used in the Czech Republic mainly in fixed fire-fighting installations named Light water. Given the lifetime of fluorinated foaming agents, and end the use of the main manufacturer 3M (since 2002), however, we cannot assume the occurrence or PFOS even in these installations.
Regulation of POPs sets limits for the concentration of PFOS in the compounds, preparations and products (e.g. for textile products 1 $\mu g/m^2$). To detect the presence of PFOS in products in the Czech Republic a pilot data collection was carried out in 2011 and 2012, and concerned materials used mainly in the production of electronics, insulation materials, textiles and transport equipment (products, covering the end of the exemption for use). Samples of the materials were obtained by collecting older materials and purchasing the new ones in the network of the current stores. The samples were divided into categories; the aim was to obtain a representative sample of various kinds of materials according to the age and according to applications. The concentration of PFOS was different in the respective samples. However it occurred across all groups of samples taken. The measured concentrations of PFOS varied from tenths up to the units of ng/g. The highest content of PFOS had been detected in the samples of phenolic insulation (22.8 $ng.g^{-1}$), paper insulation, carpets and foams. According to the document of UNEP/POPS/COP.7/INF/26 the synthetic carpets containing PFOS compounds are a significant source of direct exposure to humans and the environment, both still used carpets (especially a risk for small children), carpets for disposal (incorrect waste disposal) or recycling (prohibited by the Convention).

Conclusions
Due to their hydrophilic nature, it is necessary to pay attention to PFOS compounds in relation to water, soil and sediments, contaminated sites and waste disposal (the products in which PFOS are contained have a long life). Due to the "non-degradability" of PFOS there is a great risk of the presence of these compounds in the sludge applied to agricultural land. It is necessary to monitor the occurrence of PFOS in the compounds, preparations and products. According to information from the European Commission, especially in carpets, the so-called outdoor clothing and leather products (gloves), the exceeding of limits was determined.
The CR lacks accurate information on the extent of previous use of PFOS compounds, however stocks of such substances in the Czech Republic are not expected. Reassessment of the need of acceptable purposes is carried out so that the Czech Republic can terminate the use of PFOS in the photographic industry, photolithography and for hydraulic fluids for aviation. There is no information about the contaminated sites in the Czech Republic. Potentially contaminated can be considered those places where the PFOS compounds were and are used (treatment of metal, textile, paper and plastic operations) as well as municipal solid waste landfills. Priority should be given to prevent further contamination of the environment by incorrect handling of waste textile which has been treated with compounds based on PFOS.

2.4. Assessment of substances in Annex C

Annex C lists hexachlorobenzene (HCB), pentachlorobenzene (PeCB), polychlorinated biphenyls (PCB), polychlorinated dibenzoyl-p-dioxins and dibenzofurans (PCDD/PCDF) and polychlorinated naphthalenes (PCN). PCN are newly included in the Convention since 2015 and are discussed in more detail in a subsequent chapter *2.5 Basic inventory and evaluation of the newly classified substances (HBCDD, PCN, HCB, PCP)*. PCN, PeCB, HCB and PCB are also listed in Annex A of the Convention.

Limitation or even elimination of releases of substances listed in Annex C; substances although not intentionally produced, but generated by human activities and released into the environment, is one of the main objectives of the Convention. According to Article 5 of the Convention, the Parties shall make an inventory of resources and provide as part of their reporting obligations an estimate of the amount released from the source categories listed in Annex C, Parts II and III. Parties have the obligation to prepare action plans to prevent or minimize releases. Strategies are subject to revision every five years.
Parts II and III of Annex C lists categories of sources (industrial equipment) from which the release of POPs is assumed. For newly constructed facilities in category II there is an obligation to build them in

the mode of BAT/BEP and for category III to support construction according to new technologies. For existing sources of category II and III, the Parties shall encourage the implementation of BAT/BEP. The use and implementation of processes that lead to a reduction in unintended releases of POPs takes place in the Czech Republic in accordance with Directive 2010/75/EU[11], which is the EU legal framework for the control of industrial emissions on the environment.

The main regulatory instrument for reducing emissions of POPs are specific emission limits specified in the Implementing Regulations Act No. 201/2012 Coll.[12] (Decree No. 415/2012 Coll.[13]) or the Regional Authority in the permit of operation of a sources of air pollution, as well as emission limits and operating conditions of the sources that are also set out by operators in the permit for the operation of the source. Emission limits are not, with exemptions, directly prescribed for these compounds nor are other specific conditions of operation of sources aimed at direct limiting of these substances.

The reduction of emissions of POPs into the atmosphere is contributed by the regulation of emissions of solid particulate matter (PM) and substances bound to them, through the emission limits set for sources burning solid, liquid and some gas fuels, thermal waste utilization and other resources, for which there is usually also the combustion of fuels (metallurgical production, mineral processing, etc.). All-important groups of air pollution sources falling under the integrated pollution prevention and control (IPPC) have, among other things, the obligation to apply BAT technology and the associated low output levels of pollutants. It uses also the updated BREF[14], when for instance metallurgical plants, in order to reduce the PM and POPs, can additionally include further quality filtration and subsequent purification of exhaust gas by adding the reagent to bind PCDD/F.

Releases of POPs in Annex C (except for newly listed PCN) are monitored under IPR (Integrated Pollution Register). Releases of PCDD/F to the air are reported to the IPR from the waste incineration process, the production and processing of ferrous and non-ferrous metals production of heat and electricity and transport. Releases of PCB are also reported from waste incineration and the production and processing of ferrous and nonferrous metals. HCB compound in the Czech Republic was deliberately produced until 1968. Currently, its origin in the CR is primarily from unintentional production and formed as a by-product in the manufacture of chlorinated hydrocarbons and in the electrolytic production of chlorine itself in chemical industry.

IPR is closely related to the European register of releases and transmission of pollutants (E-PRTR) provided for in the Regulation (EC) No. 166/2006[15]. European regulation provides thresholds for the individual substances selected. When exceeding a certain amount of releases (to air, water and soil) and transmission (in waste water and waste amount, and in case of IPR at the national level also substances in waste) per year, the operators of industrial facilities have a reporting obligation. The disadvantage of IPR in relation to information on releases of POPs is that it does not cover leakages "under the limit" and not even all sources of POPs; e.g. leakage from domestic combustion of solid fuels, which are also regarded as a significant source of POPs, are not covered. Omissions in reporting are also assumed. The European Commission highlights the inconsistencies associated with the fact that the operators of certain facilities report releases and similar facility in another country do not (for example HCB or PeCB). In 2009, the Ministry of Environment prepared a single study "Increasing the expert capacity and public awareness of IPR in 2009 - expert services," focused on the assessment of leakages diffuse sources, mentioned in the E-PRTR.

By contrast, emissions to air are monitored by the air legislation, regardless of the threshold values of the sources listed in Annex No. 2 of Act No. 201/2012 Coll. and within the requirements laid down in Annex No. 11 MoE Decree No. 415/2012 Coll. From the compounds of POPs group, which are reported for emission inventories within the commitments of LRTAP, are calculated emissions of PCDD and PCDF, PAH (range 4 congeners) and PCB. The information on the recent single emission measurements (where required by the Act No. 201/2012 Coll.) are part of the reporting of the total operating records in the system ISPOP[16]. The measured data are, where appropriate, used to prepare the emission inventories.

Improvement of emission inventories of emissions from stationary and mobile sources of PAH, PCDD/F is taking place. New emission factors identified in the projects of the Technical University in

[11] European Parliament and Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control)

[12] Act of 2 May 2012 on the protection of air

[13] Decree No. 415/2012 Coll., of 21 November 2012, on the allowable level of pollution and its detection and implementation of certain other provisions of the Air Protection Act

[14] BREF reference documents are used for comparison by the competent authorities for issuing integrated permits within the Integrated Pollution Prevention and Control (IPPC).

[15] European Parliament and of the Council Regulation (EC) No. 166/2006, concerning the establishment of a European pollutant release and transfer register.

[16] An integrated system for the implementation of reporting obligations: https://www.ispop.cz/magnoliaPublic/cenia-project/uvod.html

Ostrava VEC were used http://portal.chmi.cz/files/portal/docs/uoco/oez/embil/VypocetEF.pdf. Developing emission inventory of PCB and HCB takes place for the main sectors and using internationally recognized emission factors.
Requirements for emission inventories of PeCB and PCN have not been implemented to date, among other things also because their preparation is not required by the Protocol on POPs to the Convention CLRTAP and the methodology thus is not processed within the available documents LRTAP/EEA (especially "Emission Inventory Guidebook").
Emissions of air pollutants from incinerators, as one of the main sources of POPs are monitored within the requirements laid down in Annex No. 4 of the MoE Decree No. 415/2012 Coll. From POPs group of substances, emissions are determined only by measuring polychlorinated dibenzofurans (PCDF) and polychlorinated dibenzodioxins (PCDD). The data on PCDD/PCDF emissions are handed over by the operators of incinerators as part of the operational summaries transferred to Air Quality Information System (AQIS), which includes a register of emissions and stationary sources (REZZO) pursuant to Sec. 7, para. 1 of Act No. 201/2012 Coll. Information about the operation of waste incineration and co-incineration of waste are thus publicly accessible at:
http://portal.chmi.cz/files/portal/docs/uoco/oez/emise/spalovny/evidence/index.html
http://portal.chmi.cz/files/portal/docs/uoco/web_generator/incinerators/index_CZ.html
http://portal.chmi.cz/files/portal/docs/uoco/oez/emise/spalovny/index.html (Czech version only).
Information on the reported emissions of POPs within the operational summaries is published for individual establishments here:
http://portal.chmi.cz/files/portal/docs/uoco/web_generator/plants/index_CZ.html.
BAT information relevant in the context of waste disposal is part of the BAT reference document (BREF) Waste management[17]. The implementation of BAT described in the foregoing BREF results in prevention, and if not possible, reduction of emissions and also emissions of POPs.
Reducing the release of substances in Annex C to water (excluding PCN) is provided by the Water Framework Directive[18], when exceeding environmental quality standards for these substances, the Czech Republic must take action to reduce release under the threshold level.
Determining and reduction in emissions of POPs **from diffuse sources** and their controlling is more complicated. The main sources include combustion boilers in households, which are the most frequent source of benzo(a)pyrene, but also other POPs that are released e.g. by burning plastics or chemically treated wood. According to the Clean Air Act, these resources are generally controlled in the Czech Republic by statutory revisions from 2017 by ban on the operation of the oldest boilers in 2022 and control of the material being incinerated directly by the owners of the boilers. In addition, the implementation of "BAT/BEP" boilers is supported by the so-called Boiler subsidies financed from OPE 2014-2020.
The determination of the emissions from biomass combustion in households is done based on the data of Census[19], which are maintained within AQIS, which includes a register of emissions and stationary sources according to Sec. 7, para 1 of Act No. 201/2012 Coll. (REZZO), which is kept by CHMI for MoE.

Conclusions
Emission inventory for substances Annex C is formed, except for PeCB and PCN. Guide for emission inventories and preparation of national resources would be excessively expensive for these compounds.
For basic information on releases of harmful substances into the environment serves register IPR, to which designated operators provide information on releases of substances. It is necessary to ensure that all operators subject to the reporting obligation with respect to POPs comply with that obligation (e.g. there are no reports of leakages of PeCB, however, quite often they released during the production of any chlorinated compounds and metal processing) and to continually assess the possibilities review/implementation of BAT, which will reduce leakages.

[17] Waste incineration 5.1. Disposal or recovery of hazardous waste with a capacity exceeding 10 tonnes per day involving at least one of these activities and 5.2. Disposal or recovery of waste in facilities intended for thermal treatment of waste and waste treatment 5.1 and 5.3 a) Disposal of non-hazardous waste with a capacity exceeding 50 tonnes per day involving at least one of the following activities, with the exception of municipal wastewater treatment; b) Recovery, or recovery combined with the removal of non-hazardous waste with a capacity exceeding 75 tonnes per day involving at least one of the following activities, with the exception of municipal wastewater treatment
[18] European Parliament and Council Directive 2000/60/EC, establishing a framework for Community action in the field of water policy
[19] Census and Housing

2.5. Basic inventory and evaluation of the newly classified substances (HBCDD, PCN, HCBD, PCP)

The substances were included in the 2013, 2015 and herein referred to as NEW SUBSTANCES. These are substances newly included in the action plans and strategies for the fulfilment of the obligations of the Convention. Due to new substances, the update of the Plan collects, evaluates all available information on production, use, stock, imports and exports and the impact on the environment and human health in the Czech Republic.

2.5.1. Hexabromocyclododecane

Hexabromocyclododecane (HBCDD) was included in Annex A in 2013 by the decision of the SC-6/13 with a specific exemption, which stipulates that the substance may only be used in EPS (expanded polystyrene) and XPS (extruded polystyrene) for buildings and for the same purpose can also be produced. The fact that this is a specific exemption is limited by a time horizon of 5 years and ends on 29 November 2019. In the particular case under the Convention, this period may be extended by another 5 years. Decision SC-6/13 provided the obligation to label newly produced EPS and XPS products containing HBCDD so that they are distinguishable during their entire life cycle.

Use

Hexabromocyclododecane (HBCDD) is mainly used as a retarder (or flame retardant) of combustion in polystyrene. In the Czech Republic HBCDD is used for polystyrene boards, but the substance itself was not produced, only imported (mainly from the Netherlands). Stocks of HBCDD are not expected in the Czech Republic[20]. The use of Styrofoam in insulation of buildings has spread at the end of the last century, when systems of the external contact system (ETICS) begun to be implemented. As the insulating polystyrene boards for thermal insulation of buildings the **expanded polystyrene (EPS)** is used. In the Czech Republic the production of EPS (Koplen F) with HBCDD was started in 1997. In 2010, the production increased several times due to the launch of the production of EPS panels used for thermal insulation of buildings in connection with the implementation of programs for home insulation. For the production of EPS the use of HBCDD was terminated in June 2015, and since October 1, 2015, all members of the EPS Association in the Czech Republic do not use EPS raw material with HBCDD (EPS Association of the Czech Republic, http://www.epscr.cz/). HBCDD in EPS insulation boards for thermal insulation of buildings is present in an amount up to 0.7 % by weight, which is a relatively small amount, which limits the use of these boards just for applications in building insulation.

XPS stands for **extruded polystyrene**, which is used as a stress insulation material for humid environments, inverted roofs and road base. HBCDD content is on average 3 times higher than in the EPS and ranges from 3 to 7 % by weight. Currently, however, the production of XPS with HBCDD and its use in the Czech Republic is forbidden (except for products used before the ban, see the "Legislation in the Czech Republic").

With HBCDD can be found also in the so-called **HIPS - tenacious polystyrene** (High Impact Polystyrene) in electronics, and in textile products. HIPS with HBCDD found major use in electronics mainly in video and stereo equipment, cabinets for electrical circuits, in the construction sector and lining in refrigerators. HBCDD content is in the range of 1-7 % wt. At a time when it was used, the consumption of HBCDD for HIPS was about 2% of total consumption of HBCDD in the EU.

The main textile products in which HBCDD was used, was upholstered furniture, seats in vehicles, household textiles (curtains, fabric wall coverings, mattresses, draperies, carpets) and textiles in automobiles. In these products there are the highest concentrations of HBCDD with regard to meeting the stringent standards and ranges between 10 and 15%. At a time when it was allowed in textiles, HBCDD consumption was about 2% of total HBCDD consumption in the EU (UNEP/POPS/POPRC.6/13/Add.2, UNEP/POPS/POPRC.7/19/Add.1, UNEP/POPS/POPRC.8/16/Add.3).

Legislation in the Czech Republic

Manufacturing, marketing and use of HBCDD as the substance itself and in preparations and in products in the Czech Republic is banned by the regulation on POPs. This prohibition does not apply to products already in use, and certain EPS products, which are manufactured in accordance with the authorization process under REACH[21] and imported products. The total ban of HBCDD in EPS will take effect in 2018.

[20] Information of the Association of Chemical Industry

[21] European Parliament and Council Regulation (EC) No. 1907/2006 of 18 December 2006 concerning the registration, evaluation, authorization and restriction of chemicals, establishing the European Chemicals Agency, amending Directive 1999/45/EC and repealing Council Regulation (EEC) No. 793/93 and Commission Regulation

With regard to the ongoing authorization process under REACH[22], EU and its Member States, in 2014 (the inclusion of HBCDD to the Stockholm Convention entered into force in general, exactly on 26 November) could not ratify the amendment to the Convention. Because of the aforementioned authorization process it was not yet fully clear in 2013 under what conditions HBCDD will be allowed. EU lodged a reservation, which was withdrawn only on 22 April 2016. Only on this date the change of the Convention, i.e. inclusion of HBCDD, entered into force for the EU and its Member States. At the same time, the EU registered in the spring of 2016 with the Secretariat of the Convention a specific exemption that is with regard to the internal EU legislation stricter than the Convention allows and refers to the possibilities of production and use of HBCDD only in EPS, and not in XPS. Also, in accordance with the process of re-evaluation under REACH, the duration of the exemption was limited for the EU and its Member States until 21 August 2017.

Commission Regulation (EU) 2016/293[23] together with the authorization process under REACH thus prohibits the production, import and use of HBCDD in products with one exemption, which concerns HBCDD in EPS. At the same Regulation gives the obligation to label EPS products that contain HBCDD, for easy identification of such products. The method of identification is not precisely defined, it may vary by manufacturer. Some EU producers started labelling EPS boards that do not contain HBCDD, which further assists in the resolution of the boards produced without HBCDD from those previously widely applied, which contain HBCDD. EPS and XPS from the Czech manufacturer also have different names and on their products it is now mentioned that they do not contain HBCDD.

A complete ban on the placing EPS boards with HBCDD on the market (including imported) can be expected sooner in the EU than on a global level, and after 21 February 2018 it will probably not be possible to place EPS board with HBCDD on the market and use them. This date is related to the expected date of the termination of the authorization for the use of HBCDD for European producers, which is 21 August 2017. The prohibition of use does not apply to products already in use i.e. those built into buildings.

Basic EU legislative instrument on **HBCDD in the aquatic environment** is the Water Framework Directive, WFD[24]. In Annex X[25] HBCDD is classified as a priority hazardous substance and the EU Member States must quickly take measures to cease or phase out emissions, discharges and leakages of priority hazardous substances. Environmental quality standards (EQS) are set for surface water and biota (fish) and apply to 1,3,5,7,9,11-hexabromocyclododecane (CAS No. 25637-99-4), 1,2,5, 6,9,10-hexabromocyclododecane (CAS No. 3194-55-6), α-hexabromocyclododecane (CAS No. 13437-50-6), β-hexabromocyclododecane (CAS No. 134237-51-7) and γ-hexabromocyclododecane (CAS No. 134237 -52-8). These **EQS are effective from 22 December 2018**. The Czech legislation transposed the requirements listed in Government Regulation No. 401/2015 Coll.[26]

In the EU, wastes containing HBCDD, in addition to the basic legislative regulation i.e. Waste directive[27] are governed by Commission Regulation (EU) 2016/460[28]. This Regulation shall enter into force on 30 September 2016 and sets concentration limits for the disposal of waste containing HBCDD. Low POPs content was set at 1000 mg/kg, provided that this limit must be **reassessed by 20 April 2019**. The maximum concentration limit regulation was also determined at 1000 mg/kg. The discussion determining concentrations for low POPs content also takes place in working groups under

(EC) No. 1488/94, as well as Council Directive 76/769/EEC and Commission Directives 91/155/EEC, 93/67/EEC, 93/105/EC a 2000/21/EC.

[22] On 17 February 2011 the ECHA approved the inclusion of HBCDD in Annex XIV of REACH whereas by 21 August 2015 the authorization must be completed. From that date, the production could be continued only by businesses that had applied for the authorization and had not yet been decided or that had already achieved the authorization for production (in the Czech Republic it was one company). The authorization was granted only for EPS (no application has been submitted for XPS or anything else, i.e. the ability to use HBCDD in the production of XPS ended in 2015). In January 2014 the European Chemicals Agency published a draft opinion on authorization for continued use of HBCDD for the subsequent decision of the European Commission with the final date for review on 21 August 2017.

[23] Commission Regulation (EU) 2016/293 of 1 March 2016 amending Annex I to Regulation of the European Parliament and Council Regulation (EC) No. 850/2004 on Persistent Organic Pollutants

[24] European Parliament and Council Directive 2000/60/EC, establishing a framework for Community action in the field of water policy

[25] as amended by the European Parliament and Council Directive No. 2013/39/EU, amending the Directive No. 2000/60/EC and 2008/105, as regards priority substances in the field of water policy

[26] Government Regulation No. 401/2015 Coll., on the indicators and values of permissible pollution of surface waters and waste waters, the requisites of a permit for discharging waste waters into surface waters and into sewer systems, and on sensitive areas.

[27] Directive of the European Parliament and Council Regulation (EC) No. 98/2008 of 19 November 2008 on waste and on repealing of certain directives

[28] Commission Regulation (EU) 2016/460 of 30 March 2016 amending Annex IV and V to the European Parliament and Council Regulation (EC) No. 850/2004 on Persistent Organic Pollutants

the Basel Convention[29], where there was no consensus reached so far regarding the limit. Other regulation, Directive 2012/19/EU[30] imposes the obligation to remove the plastic parts containing brominated flame retardants and printed circuits from electrical and electronic devices prior to recycling or reuse.

Waste containing HBCDD

Inclusion of substances in Annex A of the Convention means a general ban of its recycling. The limit value in the EU that determines how to dispose of waste containing HBCDD is specified for a low content of POPs. If exceeded, such waste with HBCDD may no longer be recycled, but must be handled in a special way, as waste containing POPs. Determining whether and how much HBCDD waste contains is not easy. Method of analytical determination of HBCDD is time-consuming and costly. For rough determination, there are devices that determine the presence of retardants in plastics, mostly on the basis of detection of bromine. In EPS used as packaging material, the presence of HBCDD is not assumed. In 2011, the packaging EPS in the EU accounted for 25%. In 70% of EPS (i.e. EPS applied in the construction industry) HBCDD presence can be expected until it is completely banned.

HBCDD is contained on average: 0.7% in EPS, 1.5% in XPS, 4% in HIPS, 8% - 25% in textiles. The present limit of 1000ppm is always lower and in practice this means that in the case of demonstrated presence of HBCDD (resp. Bromide), it will be considered as waste containing POPs and as such can only be used for energy (cement production - in the CR 5 equipment or facilities for energy recovery of waste - 4 in the Czech Republic) or burned (waste incinerators - in the Czech Republic there are 22). Another possibility is that HBCDD is isolated from waste and then is irreversibly destroyed. More information for the management of construction waste polystyrene is listed on the website of the Ministry of the Environment.

As noted above WEEE plastics with brominated retardants must be separated before recycling and reuse (Directive 2012/19/EU), and it means that entry of HBCDD into the recycling process is prevented. Plastic waste from electrical and electronic equipment, however, covers only a small percentage of the waste with HBCDD. Similarly for textiles treated with HBCDD, in which it can be assumed, due to the relatively short life span that the majority of treated textiles ended up in municipal waste. In the Czech Republic direct separate collection of textile waste has not yet been implemented. The largest proportion of waste with HBCDD in the Czech Republic is and especially in the future will be waste from EPS and XPS boards. Legislation prohibits the recycling of HBCDD waste and also the prohibition of land-filling of plastics in all EU countries is approaching. Tasks of Waste Management Plan aim to seek solutions for the management of construction/demolition waste containing hazardous substances. Product (insulation) life is about 25 to 50, generally from 50 to 100 years. Plastics in construction consist of 20% waste, of which 20% waste is from insulation.

The origin and occurrence in the environment in the Czech Republic

Monitoring HBCDD is based on the current river basin management plans (Section 23 - Section 25 of the Water Act[31]) by decrees No. 24/2011 Coll.[32] and No. 98/2011 Coll.[33] as later amended. Monitoring takes place in surface water and biota for assessing the chemical status of surface waters; concentration of this substance in sediment or biota must not significantly increase over time. HBCDD is also monitored in sediments. Monitoring of surface water is conducted by River Basin enterprises and in biota and sediment by Czech Hydrometeorological Institute. As noted above the environmental quality standard for this substance applies from 22 December 2018.

The occurrence of HBCDD was monitored also in pilot studies - in biotic (fish, breast milk, subcutaneous fat) and abiotic samples (sewage sludge, river sediments, dust). In fish HBCDD was detected in 80% of samples, max was 6.15 µg/kg of muscle (Kunětice - Elbe). In sewage sludge max 25 µg/kg of dry matter has been detected and in sediment max 15 µg/kg of dry matter. In human adipose tissues it was on average 1.2 µg/kg of fat (the number of samples n = 98).

Hexabromocyclododecane occurrence in internal and external environment was studied by the Research Centre for toxic substances in the environment (RECETOX) by comparing the concentration of HBCDD in buildings of different ages, constructed from various materials. Passive samplings of air were collected from Brno and surrounding communities. HBCDD concentration levels were monitored from the perspective of changes in seasons. Overview of measured concentration ranges is given in

[29] The Basel Convention on the control of movements of hazardous wastes and their disposal

[30] European Parliament and Council Directive 2012/19/EU of 4 July 2012 on waste electrical and electronic equipment (WEEE)

[31] Act No. 254/2001 Coll., on waters and amending some laws (the Water Act)

[32] Decree No. 24/2011 Coll., on the river basin management plans and plans for flood risk management

[33] Decree No. 98/2011 Coll., on the method of status assessment of surface water bodies, the method of assessment of ecological potential of heavily modified and artificial surface water bodies and the requirements of programmes of surface water status identification and assessment

Table 4 and the pattern emerges that the measured concentrations of HBCDD are higher in winter, both in the internal and external environments.

Summary of the situation in the Czech Republic

The problem with HBCDD occurs mainly when plastics containing HBCDD become wastes and thus it is necessary to avoid entering of these substances into new products by recycling and prevent leakage into the environment. Waste from EPS and XPS is and will be the largest proportion of waste with HBCDD. Even if such waste currently enters the waste stream, the larger "influx" can be expected with the termination of life of the already applied EPS or XPS boards containing the substance in construction. The lifetime of panels is estimated to 50 years +/- 25 years. Method of handling waste polystyrene which contains HBCDD is governed by the aforementioned Commission Regulation (EU) 2016/460.

In the Czech Republic the amount of applied EPS with HBCDD is difficult to estimate. In recent years, about 60,000 tons of polystyrene is annually consumed and before 2016, 80% of this amount contained HBCDD. Polystyrene waste in the Czech Republic is produced in approximately 2,000 tons per year in total, the estimate for 2021 is 3,000 tons. In the Czech Republic in future it involves the potential waste in the amount of hundreds thousand tons of EPS with HBCDD (EPS Association of the Czech Republic, http://www.epscr.cz/). It is therefore necessary to resolve the question of the future capacity for disposal and its price, which is always higher compared to landfill. Polystyrene recycling is carried out in the Czech Republic for example by REMIVA Company - http://www.remiva.cz/remiva-kontakt.html.

Future demolition of EPS from ETICS present potential problems associated for instance with the protection of health or the separation of waste. This waste must be separated from other construction waste and consequently must be used or disposed of in accordance with the legislation. Sorting waste allows recycling of waste, but it is expected that the energy use (industrial incineration at high temperatures) will be the only alternative of disposal in the event that polystyrene contains HBCDD. It does not necessarily have to be burnt in hazardous waste incineration plants; it can be even burnt in municipal waste incinerators with the best available technology (BAT).

2.5.2. Pentachlorophenol and its salts and esters

Pentachlorophenol (PCP) (CAS No. 87-86-5) and its salts and esters are included in Annex A of the Stockholm Convention by the decision SC-7/13 in 2015, with specific exemptions for the production and use (see Table 2).

Table 4: Occurrence of HBCDD in air samples in the Czech Republic (collectively)

Substance	Matrix	Concentration	Reference
HBCDD	Air / passive Sampling - Summer	0.2 ng / PUF interior environ. 0.1 to 1.0 ng / PUF external environ.	Unpublished data - RECETOX
	Air / passive Sampling - winter	0.1 to 3.7 ng / PUF interior environ. 0.1 to 4.4 ng / PUF external environ.	Unpublished data - RECETOX

CR (resp. EU) did not register the mentioned exemptions and cannot use them. PCP was listed in this "extended" way so that the Convention covers also derivatives of PCP and also because PCP itself does not meet all the criteria required for listing, but as PCP and its salts and esters, it does, while the transformational product of PCP is taken into account, so-called PCA (pentachloranisol). PCA exhibits all the properties of POP, but is not, and was not intentionally produced; is produced in the environment unintentionally by transformation reactions from PCP, HCB, and lindane (unintentionally released microbial reactions in soil and sediment). The transformation processes are not examined in detail and the extent of the release is not known. Production, use and disposal of PCP are the source of other extremely toxic POPs, which are already listed in the Convention. HCB, PeCB, dioxins and furans are released from PCP-treated wood or textiles. PCP respectively PCA is released also from unintended sources, during the combustion of organic compounds containing chlorine, certain emissions are produced by transport and chemical industry (UNEP/POPS/POPRC.9/13/Add.3, UNEP/POPS/POPRC.10/10/Add.1).

Use

PCP was formerly widely used as a biocide. Since the 30s of the last century, PCP was mainly used in the world as a fungicide to protect wood. Similarly, its salt was used, sodium pentachlorophenate (PCP-Na), which readily dissociates to the original PCP. PCP was also used in the production of pentachlorophenyl laurate (PCP-L), agents to protect fabric. It was also applied to seeds (for non-food

use), leather, masonry, into the water for cooling towers, to systems for spinning ropes and paper mills, and for disinfection.
Currently, its use is limited primarily to the protection of wooden poles (mainly electric poles), and railway sleepers; Most global consumption is attributed to North America (production in Mexico, use in the USA, Canada). The current major proportion of Na-PCP used is in textile industry accounted for India (UNEP POPS/POPRC.9/13/Add.3, UNEP/POPS/POPRC.10/10/Add.1).
In the Czech Republic respectively the former Czechoslovakia, there were several commercial products in the market in the 70s of last century (see Table 5).
Meryl and Pentalidol were produced by Spolana (made from DDT, all production was completed in the years 1978-1983). Depending on the solvent, it may have happened with the more volatile forms, that the surrounding area was contaminated by the substance. In Slovakia (Chemika plant in Horné Orešany), there was produced Pentor 70, for which was used a heavy oil solvent. Pentor 70 was produced until the 90s of the last century.
In the second half of the 70s of the past century Drevodekor product with PCP appeared on the market. The formulation used a synthetic resin and could be used to impregnate wood even in interior. Along with other ingredients the formulation provided protection against the weather and it guaranteed slowing degradation caused by UV radiation.

Table 5: Products with PCP used in the CR (taken from NIP 2006)

the active substance/agent (active substance content)	producer	Registration from - to	(Note:
Methyl N (2%)	Spolana Pentachlorophenol 3%;	new 1972	only for the impregnation of wooden surfaces
Pentalidol (2%)	Not Rated / Spolana 5% pentachlorophenol, lindane 0.1%	many years before 1972, continued at least until 1975	only for the impregnation of wooden surfaces by coloured paints
Solomitol (similar to Pentalidol)	water-soluble liquid / Spolana	Not rated to at least until 1962 (58-88)	used like Pentalidol
Pentor 70	4.5% solution of pentachlorophenol in the hydrocarbon mixture / Chemika	Used until the 90s	In the 70s Pentor 70 with this active ingredient was already on the list of products that were allowed to be used only outdoors, in the open space. **Drevodekor** was then the same product in brown modification. The use of Drevodekor and Pentor 70 was stopped in the late 80s.

Coating product Luxol also contained pentachlorophenol in the 80s as an active ingredient and was produced by one of the branches of the company Barvy a laky in Komárov. It was leached from the surface of the material more easily than Pentor 70 and Drevodekor. Since the mid-90s of the last century, PCP has not been used in Luxol.

Legislation in the Czech Republic
Biocidal products containing the active ingredient pentachlorophenol may not be marketed in the Czech Republic from 1 September 2006[34]. It is also prohibited to use and market products treated with PCP. Biocides Regulation (EU) No. 528/2012[35] allows in EU only products that have been treated with agents authorized by this Regulation and it is not PCP. In the Czech Republic the launching of biocides on the market is covered by the Act No. 342/2011 Coll.[36]

[34] The Regulation of the Commission with Delegated Authority (EU) No. 1062/2014 of 4 August 2014 relating to the work program for the systematic examination of all existing active substances contained in biocidal products that are listed in the Regulation of the European Parliament and Council Regulation (EU) No. 528 / 2012
[35] European Parliament and Council Regulation (EU) No. 528/2012 of 22 May 2012 on the supply of biocidal products on the market and use
[36] Act amending Act No. 120/2002 Coll., on conditions of placing of biocidal products and active substances on the market and amending certain related Acts, as later amended

In plant protection products PCP is banned from 25 June 2003 by the Regulation (EC) No. 1107/2009[37]. In the Czech Republic such a product was never registered and never been used. That textiles are not treated with PCP is also one of the conditions for granting eco-labelling.
Import, export of PCP is treated by the Regulation (EU) 649/2012[38], i.e. Regulation implementing the Rotterdam Convention[39]. Pentachlorophenol is listed in Parts 1 and 3 of Annex I to the Regulation and is covered by the so-called Prior Informed Consent (PIC) in the category of pesticides. Because of the proven contamination of guar gum originating in or consigned from India by dioxins and PCP, the Implementing Commission Regulation (EU) 2015/175 was published to the Commission Regulation (EU) No. 231/2012[40], providing the system of monitoring of its import. Limiting the amount in the gum is set at 0.01 mg/kg of PCP.
Leakages of PCP are covered by Regulation (EC) No. 166/2006[41], which is given in Annex II and among other things sets thresholds for releases to air, water and soil and transmission of substances in waste water, above which the operator has the notification obligation, which is done through the Integrated Pollution Register (IPR). Emission limits of PCP for incineration plants are set in Directive No. 2010/75/EU[42].
Basic EU legislative instrument on PCP in the aquatic environment is the Water Framework Directive, WFD[43]. In Annex X[44] PCP is classified as a priority substance and EU Member States must quickly take measures to reduce pollution caused by priority substances.
Pentachlorophenol is a particularly dangerous substance in accordance with Annex No. 1 to the Water Act[45]. The main legislative instrument in the Czech Republic, which covers all discharges of PCP into the aquatic environment, is the Government Regulation No. 401/2015 Coll.[46] This regulation establishes acceptable emission standards for PCP content in discharged industrial wastewater and also sets environmental quality standards for surface waters. The Regulation implements the framework directive on waters where PCP is listed as a priority substance. Following this directive PCP is classified as a priority pollutant in Decree No. 414/2013 Coll.[47]

The origin and occurrence in the environment in the Czech Republic
Monitoring of pentachlorophenol is based on the current river basin management plans (Section 23 - Section 25 of the Water Act) by decrees No. 24/2011 Coll.[48] and No. 98/2011 Coll.[49], as later amended, in surface waters for assessing the chemical status of surface waters. Regular monitoring of pentachlorophenol are performed by River Basin enterprises in the surface water and by the Czech Hydrometeorological Institute in sedimentable suspended solids. The first data are available since 1991 (in groundwater) or 1996 (in surface water), in sediments and suspended sediments. All data is collected online via IS-ARROW, Information System of Assessment and Reference Reports of Water Monitoring in the CR. Information is available on the website of the Czech Hydrometeorological Institute
(http://hydro.chmi.cz/pasporty/pasport.php?seq=3287509&mf=10).

[37] European Parliament and Council Regulation (EC) No. 1107/2009 of 21 October 2009 concerning the placing of plant protection products on the market and repealing Council Directives 79/117/EEC and 91/414/EEC
[38] European Parliament and Council Regulation (EU) No. 649/2012 of 4 July 2012 concerning the export and import of dangerous chemicals
[39] Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, Rotterdam, Netherlands 1998
[40] Commission Regulation (EU) No. 231/2012 of 9 March 2012 laying down specifications for food additives listed in Annexes II and III of the European Parliament and Council Regulation (EC) No. 1333/2008.
[41] European Parliament and Council Regulation (EC) No. 166/2006 of 18 January 2006, concerning the establishment of a European pollutant release and transfer register and repealing the Council Directive 91/689/EEC a 96/61/EC
[42] European Parliament and Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
[43] European Parliament and Council Directive 2000/60/EC, establishing a framework for Community action in the field of water policy
[44] as amended by the European Parliament and Council Directive No. 2013/39/EU, amending the Directive No. 2000/60/EC and 2008/105, as regards priority substances in the field of water policy
[45] Act No. 254/2001 Coll., on waters and amending some laws (the Water Act)
[46] Government Regulation No. 401/2015 Coll., on the indicators and values of permissible pollution of surface waters and waste waters, the requisites of a permit for discharging waste waters into surface waters and into sewer systems, and on sensitive areas.
[47] Decree No. 414/2013 Coll. on the scope and manner of keeping records of decisions, general measures, binding opinions, approvals and notifications, for which approval was given by the Water Act and parts of the decision by the Integrated Prevention Act (concerning water evidence)
[48] Decree No. 24/2011 Coll., on the river basin management plans and plans for flood risk management
[49] Decree No. 98/2011 Coll., on the method of status assessment of surface water bodies, the method of assessment of ecological potential of heavily modified and artificial surface water bodies and the requirements of programmes of surface water status identification and assessment

Summary of the situation in the Czech Republic
In the Czech Republic there was production of PCP from 70th to 90th years of the last century (Spolana Neratovice) and the substance was used in the last century in the Czech Republic to impregnate wood. Besides the contamination of Spolana (the operation has been already closed and partially redeveloped) are thus potentially contaminated also plants in which the wood or textiles were treated by such preparations. Currently, it can be expected that it is contained in the paint of older wood products, such as fences, window frames, doors. PCP was also used in the restoration (Skansens). In conventional constructions such as structural timber, e.g. beams and boards it was more likely impregnated with carbolic acid. The amount of wood impregnated with PCP is not exactly known and without a direct analysis it is not possible to recognize that the wood was treated by the substance, which greatly worsens the identification of such waste. In addition, PCP, depending on the solvents used, was quite often and quickly washed out of the wood. The lifetime products that have been treated with PCP, is expected to 15-30 years and can therefore be expected that a significant proportion of waste wood with PCP has probably been burned or thrown away to landfills. The range of application in textiles is not known, in any case, for their impregnation PCP was used in several times higher concentrations compared to wood. In the Czech Republic the incidence and use of fabrics treated with these compounds, due to the relatively small lifetime of textile products, is also no longer expected, most have probably ended up in municipal waste. The exemption should only be textiles used by the Army ("outdoor"). It cannot be excluded that these substances may occur in imported products.

2.5.3. Polychlorinated naphthalenes

Polychlorinated naphthalenes were listed in Annex A and C of the Stockholm Convention by the Decision No. SC 7/14 in 2015 as chlorinated naphthalenes (CN) from a di- to octa-derivatives. They were listed in Annex A with exemptions for the production and use (see Table 2). CR (resp. EU) did not register the mentioned exemptions.

Use
PCN were first synthesized in 1833. During the First World War were used to protect paper and fabrics. After the First World War, they were used especially their commercial technical mixtures, as dielectrics of condensers, additives in motor oils, casting moulds, preservatives for wood, paper and fabric to reduce their flammability. They were also used in the production of insulators of electrical conductors. After World War II the production of PCN began to decrease because of their replacement by plastics and PCB. Commercial technical mixtures of PCN produced in the USA were called Halowax and were produced primarily from Bakelite Corporation and Koppers Company. In the UK it was Seekay waxes (Imperial Industries) and Germany it was Nibren waxes (Bayer). At present, their use is terminated (UNEP/POPS/POPRC.8/16/Add.1, UNEP/POPS/POPRC.9/13/Add.1).

Legislation in the Czech Republic
Officially, the production and use of PCN in the Czech Republic was banned from 2013 onward by the Commission Regulation (EU) 519/2012[50], because polychlorinated naphthalene are listed as substances to be removed in the Protocol on POPs to the Convention on Long-range Transboundary Air (CLRTAP) and Regulation (EC) No. 850/2004 implements in addition to the Stockholm Convention also obligations of the Protocol. Unintended releases from production are covered by Directive 2010/75/EU[51]; where activities will reach thresholds, it is necessary to apply the best available techniques for the prevention and control of emissions and their impact on the environment as a whole. PCN are not separately listed in the registry of releases (E-PRTR), only naphthalene is monitored. Naphthalene is also observed in transmission of substances into waste, based on the Government Regulation No. 145/2008 Coll.[52] Naphthalene is also a priority substance determined by the Government Regulation No. 401/2015 Coll. and in the Czech Republic there is monitoring for assessing the chemical status of surface waters. CHMI also performs monitoring of groundwater, and in solid matrices.

The origin and occurrence in the environment in the Czech Republic
In the Czech Republic PCN was not deliberately produced. Problems were arising in the chlorination of biphenyls, as part of the technical mixture was also naphthalene (for production of Delor the content of PCN was from 82 to 450 mg/g)

[50] Commission Regulation (EU) 519/2012 of 19 June 2012 amending Annex I to Regulation of the European Parliament and Council Regulation (EC) No. 850/2004 on Persistent Organic Pollutants
[51] European Parliament and Council Directive 2010/75/EU of 24 November 2010 on industrial emissions (integrated pollution prevention and control)
[52] Government Regulation No. 145/2008 Coll., laying down the list of pollutants and thresholds and data required for reporting to the Integrated Pollution Register.

(http://www.ekomonitor.cz/sites/default/files/09_Holoubek.pdf). If imported, it was probably only the period before the Second World War, in a subsequent period there are no reliable data available. According to information available, however, in CR they were not used. Sources of occurrence are combustion of waste, transport, emissions from landfills and chemical industries. PCN can still be detected in some electronic components. Other potential sources of PCN are pyrotechnics and contaminated sites. Occurrence of PCN is often accompanied by waste from the manufacture of chlorine and alkali hydroxide and from PCB burdens, which accompany the occurrence of PCB equipment since PCN are common impurities found in a technical mixtures of PCB (from 0.01 to 0.09 % PCN in PCB liquids): technical biphenyl used to manufacture the PCB contains naphthalene. Simultaneously with the chlorination of biphenyl, naphthalene is also chlorinated, because conditions for creation of PCB in an industrial scale are about the same as for the formation of PCN.
With regard to the PCN concentrations in the environment in the Czech Republic there are pilot data available from monitoring levels of PCB and PCN in passive and active air sampling. The most prevalent in the congener composition were lighter PCN (mono to tetraCN). The highest concentrations of PCN were found in urban areas near busy traffic intersections and industrial sites. The lowest concentrations were found at rural background locations. A likely source of PCN at background and rural areas can be considered the atmospheric transmission. In urban and industrial sites the source may be combustion processes, transport and atmospheric transmission. The concentrations of PCN in comparison with PCB are approximately by 2 (resp. 4) orders lower. This pilot study also showed a significant correlation between the concentrations of PCB and PCN.
In soils the found PCN concentration ranges between 0.1 to 1.1 ng/g. Concentrations of PCN are by 1-2 orders lower than the concentration of PCB. The exemption was the locality of Uherské Hradiště Colorlak where the concentrations of PCN were found by 4 orders lower than that of PCB. Large quantities of PCB in this area come mainly from the historical burden. On the other hand, the location of Radotín, Lochkov has a higher burden of PCN. Sources of PCN in soil may be the historical burden of PCB and atmospheric deposition.

Summary of the situation in the Czech Republic
In the Czech Republic PCN was not produced and was not even used. Incineration of waste is considered to be the largest current source of these substances. PCN have a similar mechanism of formation as dioxins and furans, from the same sources, and thus the implementation of BAT for dioxins and furans also cover these substances. The occurrence of PCN is often associated with the production of alkali hydroxides. The amount of polychlorinated naphthalenes escaping from landfill sites and stocks of old appliances and electronic components is not known. Measures introduced against PCB cover also PCN, which is present in mixtures thereof. No information is available on contaminated sites with exclusive occurrence of PCN or soil contamination from landfills. For PCN data is not available on releases to air, water and soil and regular monitoring. It will be needed to introduce monitoring of occurrence in relevant environmental media (air, human matrices).

2.5.4. Hexachlorobutadiene

While POPRC suggested inclusion of hexachlorobutadiene (HCBD) to Annex A/B and C at COP7 in 2015, it was listed only in Annex A (Decision SC-12/7) without any exemptions. However, the decision of SC-7/11 of 2015 imposed on POPRC for further Conference of the Parties to supplement the information that could possibly further support its inclusion into Annex C. At its 12th meeting POPRC stated in its decision regarding HCBD an unsolved problem in relation to the benefit of financial expenses that inclusion in Annex C would bring. COP8 in 2017 decided to include the substance in Annex C. The entry into force of this Convention amendment is expected in the fall/winter of 2018.

Production and Use
Overall, there is very little information regarding the production of HCBD. In Europe, this substance has not been produced or used. HCBD is used as an intermediate for many industrial processes. HCBD was used and in some countries is still used in the manufacture of lubricants and some components in the rubber industry (chloroprene rubber), also used as a pesticide in agriculture and as a heat transfer and hydraulic fluid (substitution of PCB) and as the filling of gyroscopes. (UNEP/POPS/POPRC.8/16/Add.2, UNEP/POPS/POPRC.9/13/Add.2).

Legislation in the Czech Republic
Production, use, import, export is prohibited by the Commission Regulation (EU) No. 519/2012[53] (implementation of listing the substance in the Protocol on POPs). Basic EU legislative instrument on HCBD in the aquatic environment is the Water Framework Directive, WFD[54]. In Annex X[55] HCBD is

[53] Commission Regulation (EU) 519/2012 of 19 June 2012 amending Annex I to Regulation of the European Parliament and Council Regulation (EC) No. 850/2004 on Persistent Organic Pollutants
[54] European Parliament and Council Directive 2000/60/EC, establishing a framework for Community action in the field of water policy

classified as a priority hazardous substance, i.e. the EU Member States must quickly take measures to cease or phase out emissions, discharges and leakages of priority hazardous substances. Following this directive HCBD is classified as a priority pollutant in Decree No. 414/2013 Coll.[56]

Table 6: Releases of HCBD reported to IPR

Year	Total leakage to water kg/year	Total transfer in wastes kg/year
2004		161,290
2005		178,078
2006		194,258
2007		175,156
2008	3.24	140,195
2009	8.00	66,091
2010	5.22	162,110

HCBD is a particularly dangerous substance in accordance with Annex No. 1 to the Water Act[57]. The main legislative instrument in the Czech Republic, which covers all discharges of HCBD into the aquatic environment is the Government Regulation No. 401/2015 Coll.[58] This regulation establishes allowable emission standards for HCBD content in discharged industrial wastewater and also sets environmental quality standards for the content of HCBD in surface water and biota (fish), and requires no increase in the content of these substances in sediment and biota.
HCBD is also included in Annex II of the E-PRTR[59]. It sets thresholds for releases to air, water and soil and transmission of substances in waste water, above which the operator has the notification obligation, which is done through the Integrated Pollution Register (IPR).

The origin and occurrence in the environment in the Czech Republic
Monitoring HCBD is based on the current river basin management plans (Section 23 - Section 25 of the Water Act[60]) by Decrees No. 24/2011 Coll.[61] and No. 98/2011 Coll.[62] as later amended. Monitoring takes place in surface water and biota for assessing the chemical status of surface waters.
Regular monitoring of hexachlorobutadiene is done by River Basin enterprises carried in surface waters and CHMI in solid matrices (sediments and biota). The first data are available from 1997 to the end of 2009 (up to 397 sites/water profiles in the CR) and in sediments (up to 47 sites in the years 2001-2007). Information is available online via IS-ARROW[63] (http://hydro.chmi.cz/isarrow/).
Hexachlorobutadiene was found in increased concentrations in urban areas (up to 0.5 μg/m^3, background concentrations were below 1 pg/m^3). HCBD is also subject to monitoring in IPR (see Table 6).
Information from IPR is available until 2010, including when the leakage was detected in water from the wastewater treatment plant in Brno Modřice (4 kg/year) and in Uherský Brod (1.224 kg/year). At the same time Association for chemical and metallurgical production (Spolek pro chemickou a hutní výrobu, a.s.) reported transmission of hexachlorobutadiene in waste amounting to 162,110 kg/year (www.irz.cz). After 2010, there are no data in the IPR reported, although the Government Regulation No. 450/2011 Coll., by which the number of reported substances in waste transmitted off-site was limited from the original 72 to 26 (i.e. Annex No. 2 of the Regulation was later amended), merely limited the obligation to hand over information on releases in waste.

[55] as amended by the European Parliament and Council Directive No. 2013/39/EU, amending the Directive No. 2000/60/EC and 2008/105, as regards priority substances in the field of water policy
[56] Decree No. 414/2013 Coll. on the scope and manner of keeping records of decisions, general measures, binding opinions, approvals and notifications, for which approval was given by the Water Act and parts of the decision by the Integrated Prevention Act (concerning water evidence)
[57] Act No. 254/2001 Coll., on waters and amending some laws (the Water Act)
[58] Government Regulation No. 401/2015 Coll., on the indicators and values of permissible pollution of surface waters and waste waters, the requisites of a permit for discharging waste waters into surface waters and into sewer systems, and on sensitive areas.
[59] European Parliament and Council Regulation (EC) No. 166/2006, concerning the establishment of a European pollutant release and transfer register and repealing the Council Directive 91/689/EEC a 96/61/EC (E-PRTR).
[60] Act No. 254/2001 Coll., on waters and amending some laws (the Water Act)
[61] Decree No. 24/2011 Coll., on the river basin management plans and plans for flood risk management
[62] Decree No. 98/2011 Coll., on the method of status assessment of surface water bodies, the method of assessment of ecological potential of heavily modified and artificial surface water bodies and the requirements of programmes of surface water status identification and assessment
[63] Information system for monitoring water quality in the Czech Republic (Assessment and Reference Reports of Water Monitoring) on the website of the Czech Hydrometeorological Institute

Summary of the situation in the Czech Republic
Hexachlorobutadiene in the Czech Republic was never produced intentionally. In the Czech Republic it is not used, no data are available on earlier application. An important source is the unintended production. In the Czech Republic HCBD origins in industrial plants as a byproduct of the production of chlorinated hydrocarbons and is disposed of in a hazardous waste incinerator. Regular monitoring is carried out in the waters, and HCBD is also included in the IPR. The Government Regulation No. 450/2011 Coll. limits the number of the reported substances in waste transmitted offsite from the original 72 to 26. Monitoring transmission of HCBD in waste should be re-introduced as soon as possible due to its inclusion in the Convention.

2.6. Stockpiles and wastes with POPs

Article 6 requires Parties to ensure that management of stockpiles containing POPs listed in Annexes A and B and waste contaminated with a chemical listed in Annex A, B or C is in a manner that protects the environment and human health before their harmful effects. Parties must identify potential stocks and provide information on the presence of POPs in products and waste.

Stocks
Since the use of most of the substances listed in the Convention is banned in the EU, they should be managed as waste. Stocks can be identified for substances that are still allowed to be used in some extent. This is true of stocks of PCB in used facilities (see chapter *2.3.2. Assessment for industrial substances in Annex A*) and substances that can be used on the basis of registered exemptions. From the previously classified substances in the Czech Republic it will be possible to use for some time only PFOS compounds (see chapter 2.3.4. *Assessment of Pesticides in industrial substances in Annex B*). For these substances there were no stocks identified in the Czech Republic.

Used products
Of the substances listed in the Convention the occurrence in the products concerns in the CR mainly products containing PCB, brominated flame retardants and PFOS-based compounds. More detailed information is given for each substance in the previous chapters *2.3.2. Assessment of industrial substances in Annex A* and *2.3.4. Assessment of industrial substances in Annex B.*

Wastes containing/contaminated POPs
The issue of POPs wastes in the Czech Republic concerns mostly industrial materials, as most of the stocks and waste of chlorinated pesticides were removed in the Czech Republic in the first half of the 90s of the last century. According to the Waste Act[64] Persistent organic pollutants (POPs) waste means waste containing at least one of the substances listed in Annex IV directly applicable European Community regulation on persistent organic pollutants i.e. Regulation on POPs[65].
The Regulation on POPs in Annexes IV and V set concentration limits, which are decisive for the handling of waste with POPs. It concerns low levels of POPs (See Annex IV Regulation "low POP content"), which means below this limit the waste can be treated as household waste, above this limit it must be handled so as to irreversibly destroy or convert POPs in waste. The second limit value is set for the individual POPs in Annex V. This is a high POPs content, which is the limit to which it is possible to treat waste containing POPs (however, limited only to wastes listed in Part II of this Annex: from thermal processes, building and demolition wastes/including excavated soil from contaminated sites/, waste from waste treatment facilities, from sewage treatment plants located outside the place of their origin and preparation of water for human consumption and water from industrial use) under special provisions and this means that the content of POPs don't need to be irreversibly destroyed/converted, but such waste must be safely stored. Limit concentrations for both low POPs content and high POPs content are already set in the Regulation on POPs for all POPs listed in the Convention. Waste Management Plans (WMP) - last one for 2003-2012 and the current one for 2015-2024 (https://www.mzp.cz/cz/plan_odpadoveho_hospodarstvi_cr) deal with and solve the issue of POPs in waste within chapters on polychlorinated biphenyls (PCB) and POPs.

Capacity and facilities for POPs destruction/removal in the Czech Republic
The capacity of facilities for the disposal of wastes containing POPs and PCB is summarized in Table 7. The capacity of facilities is not set only for POPs, respectively PCB, but for all hazardous wastes subject to authorization for admission to the facility. Based on the new WMP, methodology will be established for monitoring the occurrence of selected POPs in waste.

[64] Act No. 185/2001 Coll., of 15 May 2001, On waste and amendments of some laws (Waste Act)
[65] European Parliament and Council Regulation (EC) 850/2004 of 29 March 2004 on Persistent Organic Pollutants amending Directive No. 79/117/EEC

Table 7: Capacity and facilities for POPs destruction/removal in the Czech Republic

Installations	Address	Management Code*	Capacity (t)
ALFA SYSTEM s.r.o. Thermal desorption and biodegradation	Areál šachty No. 16 - Příbram – Háje; 261 01 Příbram 1	R12, D9, D8, R3	annual: (14850)
EKOTERMEX, a.s. - 2 installations: CZB00129 (incinerator) CZB00730 (physicochemical treatment)	Pustiměřské Prusy 268; 683 21 Pustiměř	D10, R12, D9, D13	CZB00129: annual: 3500 daily: 9.8 CZB00730: daily: 10
RUMPOLD Ltd. dismantling, treatment	kpt. Jaroše 2418; 390 03 Tábor	R12, D13, D14	annual: 100
Incinerator of industrial waste SUEZ Resource utilization - Ostrava	Slovenská 2071/100; 709 00 Ostrava	D10	annual: (21200)
ADC služby, s.r.o. Regeneration and crushing	Podbřežice, 683 01	R12, D14, D13, R6, R2, R3, R7	annual: 400 daily: 1.66
Green Waste Services, s.r.o. Crushing, physicochemical treatment	Tyršova 20, Rovensko pod Troskami, 51101	R12, D13, D14	Maximum instantaneous: 180
Purum s.r.o. Biodegradation and decontamination	Rynoltice 149 Liberec 46355	R3, R12, D8	annual: 4000

* Code defines methods of disposal and recovery of waste according to Annex I and II of the European Parliament and Council Directive 2006/12/EC of 5 April 2006 on waste and repealing certain directives.

2.7. Identification of contaminated sites

According to Article 6, paragraph 1(e) Parties should identify sites contaminated by POPs and seek their remediation in an environmentally sound manner.

Legislation in the Czech Republic

A number of laws address the issue of contaminated sites, whether on the level of the EU or the Czech Republic. But there is no direct regulation that would cover this issue.

In the EU the basic document for soil protection is the "Thematic Strategy on soil protection" from 2006. The strategy includes the creation of a legislative framework for the protection and sustainable use of soil, integration of soil protection into the policies of the Member States and the Community, strengthening the knowledge base and increasing the public awareness. The proposal for a framework directive on soil protection has not yet been approved in the EU (most recently rejected in 2014) and in the near future a significant shift in negotiation is not expected. This Directive should, inter alia, address also the mandatory measures to prevent soil contamination and its solution. Resolving old ecological burdens and soil contamination remains within the national competence of Member States.

The key legislation, with which the Czech Republic is addressing the remediation of contaminated sites, is the Water Act[66]. According to Sec. 42, para 4 this Act imposes an obligation to take measures to remedy the defective condition (i.e. the removal of the source of contamination) if there is a serious threat or pollution of surface water or groundwater.

Other related provisions fall within the field of waste management, especially the Decree No. 437/2016 Coll.[67], in which the set limit values for PCB and PAH in sludge applied to farmland.

In the area of soil protection it is the Act No. 41/2015 Coll.[68], especially it's implementing regulation, the Decree No. 13/1994 Coll.[69] as later amended, which regulates some details of protection of agricultural land fund.

[66] Act No. 254/2001 Coll., on waters and amending some laws (the Water Act)

[67] Decree No. 437/2016 Coll., On the conditions of use of treated sludge on agricultural land and amending Decree No. 383/2001 Coll., on details of waste management and amending Decree No. 341/2008 Coll., on details of management of biodegradable waste and amending Decree No. 294/2005 Coll., on conditions of depositing waste in landfills and its use on the surface of the ground and amendments to Decree No. 383/2001 Coll., on details of waste management (Decree on details of management of biologically degradable waste).

[68] The Act of 10 February 2015 amending Act No. 334/1992 Coll., on protection of agricultural land fund, as later amended, and the Act No. 388/1991 Coll., on the State Environmental Fund of the Czech Republic, as later amended.

In addition, there are a number of methodologies that MoE has developed as a solution of contaminated sites for their identification, surveys sites, risk assessment, removal, respectively remediation (http://www.mzp.cz/cz/metodiky_ekologicke_zateze).

Summary of the situation in the Czech Republic

The issue of remediation of old environmental burdens, respectively the solution of contaminated sites is not controlled centrally by uniform legislation and is managed by corresponding sectors. The competence of the Ministry of Environment, respectively the Department of environmental risks and ecological damage is the removal of old environmental burdens caused by residence of the Soviet Army. In addition, as an expert guarantor it is involved in the process of removing old environmental burdens incurred before privatization. An integral part of the main activities of the department is also the methodological and technical assistance to regional authorities, which addresses the issue of the removal of old environmental burdens through paragraph 4, Sec. 42 of the Water Act. An important help of regional, as well as other authorities in this respect is the Operational Program Environment (OPE) and also the National Environment Program (NPŽP). Representatives of the Department are also in inter-ministerial committees that address the restoration of areas affected by mining. The Czech Republic has a publicly accessible database of contaminated sites **CSDS 2** (Registration system for contaminated sites www.sekm.cz). Database (under the former name SESEZ) was the output of the project of the Ministry of Environment in 1996-98 under the Program of environmental care. In 2004, the database has been modified to match the output information requirements of the European Environment Agency (EEA). The database administrator is the Ministry of Environment, Department of environmental risks and ecological damage.

The database contains information entered on sites contaminated or potentially contaminated with POPs, which were identified in 2009-10 under the "Inventory of environmental burdens, respectively contaminated sites with the occurrence of persistent organic pollutants (POPs)." The outcome of the project was the creation of the union information material including sites with occurrence or potential occurrence of POPs contamination (mostly they were PCB, PAH and pesticides), known by the end of 2009.

The material contains information about the current state of these sites including implemented remedial measures. The database contains the information with the basic data for all locations (coordinates, location, geology, existing conditions, assets and, where appropriate planned use, etc.). For all sites, the priority category was evaluated according to the Annex 4 of the methodological guidelines of the MoE No. 2/2011[70].

In 2009-2010 there were 1010 POPs contaminated sites identified (respectively 1005 sites, 5 records has been removed). From these locations 639 sites are currently unsatisfactory, 277 sites are satisfactory and 89 sites have been improved. According to the nature of further procedure, the corrective action is required for 200 locations, the contamination survey and monitoring of the development of contamination is necessary at 551 sites, 173 sites require institutional control of the method of use of the site and for the remaining 81 locations no action is necessary.

After 2010 the nationwide inventory of sites contaminated with POPs did not take place, but other places are added to CSDS 2 continuously (OPE, NPE project outputs). After 2010 there were 81 new sites added. Table 8 summarizes the existing information (to September 2016), which is provided by CSDS 2 on sites with POPs.

From 2009 to 2012 the project CENIA "National inventory of contaminated sites, Phase I" (**NIKM I**) was also implemented, funded from OPE. The aim of the project inventory was to enter into the inventory database all the old environmental burdens (approx. 7000), respectively contaminated and potentially contaminated sites throughout the entire Czech Republic still contained in various sources of information (resort, regional authorities and other sources) and add further locations identified by targeted surface mapping of the Czech Republic.

In the first stage the proposed procedures were tested in pilot areas and the inventory methodology was created. The second phase will use GIS analysis of older aircraft and satellite images to search for other potentially contaminated locations and its objective is to get information about the new sites or upgrade information on existing locations so as to complete the inventory. Completion of the II. stage of NIKM can be expected for 2023. Environment Operational Program for 2014-2020 includes a priority axis 3, in which the specific objective 3.4 "The completion of inventory and the removal of old environmental burdens."

[69] Decree No. 13/1994 of the Ministry of Environment, regulating certain details of protection of the agricultural land fund

[70] Methodological Guidelines of MoE on filling of the CSDS database, including an assessment of priorities, Journal of the MoE No. 3, March 2011

Table 8: Setting priorities for locations with the occurrence of POPs (as of September 2016)

Groups of POPs	Number of localities	Codes of priorities*				
		A1-A3	P3-P4	P2	P1	N0-N2
PCB	387	12%	48%	8%	14%	16%
PAH	495	32%	23%	13%	20%	13%
Pesticides	169	7%	76 %	8%	2%	7%

* According to the Guideline of MoE for the performance of contaminated sites monitoring system, including the evaluation of priorities

A1-A3: corrective measures are necessary or desirable, P3-P4 contamination survey is necessary, P2: further monitoring of development of contamination in time is necessary, P1 need for institutional control of the method of use of locations, N0-N2: No action needed

Ministry of Agriculture completed the identification and global remediation of sites contaminated with obsolete pesticides on 1 January 2011. At present, removing the effects of pesticide contamination globally in this sector does not take place and occurs only in justified and specific cases at the request of the owner of the property and is possible in the period of 2014-2020 via OPE goal 4, axe 3.
POPs inventory was completed by the Ministry of Defence in January 2009, more specific information from this ministry are not available.
As for the occurrence of individual or groups of POPs, from existing CSDS database it is possible to obtain more specific information on the presence of PCB, PAH and pesticides. The systematic identification of potentially contaminated sites mainly by industrial POPs added to the Convention after 2009 has not yet been performed. The main POPs that can be most commonly expected at contaminated sites are next to the "old" POPs (PCB, PAH, HCH, PCDD/F), also newly listed PFOS compounds and HCBD, due to their hydrophilic nature. Individual contaminated sites are usually not contaminated by only a single compound or group of compounds e.g. 85 sites with PAH is also stated as contaminated by PCB.

Conclusions
CSDS 2 database is continuously updated with information about current changes in the state of contaminated sites and other locations. The information on the chemical composition of sites is often missing and the quality of entered information is not uniform. The problem is also that at present there is no general duty to provide information to the database. Information on sites contaminated by "new" POPs (brominated flame retardants, compounds based PFOS, PCN, HCBD, PCP and chlorinated paraffins with short chains) is missing. It is necessary to address this issue and assess potential risks.

2.8. Awareness and education

Current level of information, awareness raising, and education among target groups; mechanism for information exchange with target groups and other Parties to the Convention

Mechanism for the exchange of information and awareness in the Czech Republic
In the Czech Republic there is a mechanism for information exchange and coordination on the issue of POPs at the national level since 2005. **The Council of the National Centre for toxic compounds (Council)** is an inter-ministerial advisory body to the Minister of the Environment. In the Council, which meets to discuss the status of implementation and the relevant changes and priorities, takes place at national level at least 2 times a year. Members are representatives of the National Centre for Toxic Substances (National Centre) and the relevant ministries (Ministry of Environment, Ministry of Health, Ministry of Agriculture, Industry and Trade, Ministry of Defence, Ministry of Finance, Ministry of Education, Ministry of Transport, Ministry of Regional Development), the Association of chemical industry and NGO representatives. At the meetings they address current issues arising from the implementation of international conventions focused on chemicals and their connection with the fulfilment of the commitments of the Czech Republic arising from the implementation of the Convention. In October 2015 a subordinate body of the Council = the National Panel on human biomonitoring was established, as a national expert and institutional structure for the long term and sustained involvement of the Czech Republic in **European initiatives to biomonitoring** (**HBM4EU**, .https://www.hbm4eu.eu/). Active members of the national panel are the following institutions: Masaryk University, Charles University, Prague Institute of Chemical Technology, NIPH in Prague, Institute of Experimental Medicine AS, Czech University of Agriculture, Institute of Health Information and Statistics (IHIS) as well as the Ministry of Environment and National Centre. The main objective of this platform is the transfer of information from science to politics and the requirements of decision-makers back to scientists, the search for answers to the problems associated with population exposure, the involvement in national coordination structures, the inventory and analysis of information on

biomonitoring of chemicals in the Czech Republic and the use of outputs for decision at least in the period to 2020.

In addition to that the information and awareness-raising is provided by several electronic databases and information systems that are publicly accessible. These include mainly **GENASIS** (Global System for Environmental Assessment www.genasis.cz), which is affiliated to the Unique Information System environment (JISŽP) of the Czech Republic and to the Ministry of Environment serves as the official tool for the inventory of persistent organic pollutants (POPs) to support decision-making processes and for the purposes of multilateral environmental agreements. GENASIS information system developed at Masaryk University RECETOX in cooperation with the Institute of biostatistics and analysis provides comprehensive information on concentrations of chemicals in the environment and human tissues used for standardized data storage from a wide range of providers ensures their international availability and allows for their further use. The portal and its tools allow visualisation, analysis, interpretation, and clear presentation of data and are usable by a spectrum of users from experts, decision-makers up to the public. The system is used at the international level, when it presents data from international monitoring networks as GAPS (Global Air Passive Sampling) operated by Environment Canada or LAPAN (Latin American Passive Air Network) coordinated by the University of Rio Grande in Brazil and provides support to decision makers internationally - its most important partners are UNEP, EMEP and GEOSS.

For the purposes of the Global Monitoring Plan (GMP) of the Stockholm Convention in the Czech Republic RECETOX developed information system presenting all global data on contamination of air, water, and blood and breast milk by substances listed in the Convention. Portal GMP (www.pops-gmp.org) clearly displays available information on spatial and temporal trends in concentrations of monitored substances necessary for evaluating the effectiveness of international agreements, including analytical tools and online data visualization. Both of the aforementioned environmental databases are also connected to the Global Information Systems GEOSS.

Internet portal www.synergie-chemie.cz is an arranged site for professionals as well as the general public of the Czech Republic. It explain the process of synergies in the area of chemicals and waste (strengthening cooperation and coordination when handling chemicals), which tools it concerns and provides information about the current events relevant to the national level. The portal includes a uniform and transparent information about the four global conventions on chemicals (Stockholm Convention on Persistent Organic Pollutants, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade, the Basel Convention on the control of the movement of hazardous waste across borders and their disposal and Minamata Convention on mercury), on non-legally binding global framework SAICM (Strategic approach to international chemicals management) and European chemical policy (REACH). It also provides information on contact persons or departments responsible for the issue of chemicals management and makes issues available to the general public. The portal exists in the Czech version, with one brief site in English, stating that the site is intended for Czech-speaking users, and provides a link to the original website (http://synergies.pops.int/). The website is administered by the National Centre for toxic compounds in cooperation with the Ministry of the Environment.

To share information about POPs the CR uses also a website, printed and electronic RECETOX newsletter and other media. On the website of the National Centre (www.recetox.muni.cz/NC) there are fundamental documents, including the Statute of the National Centre and its governing body - the Council of the National Centre, the National Implementation Plan of the Stockholm Convention in the original and updated versions, and information on the outcomes of projects related to POPs and other activities related to POPs.

Also, information on the issue of POPs is reported in the journal of Masaryk University MUNI (www.online.muni.cz) and in RECETOX newsletter (starting from 2012 in Czech and English, mostly 3 issues per year): www.recetox.muni.cz/index.php?pg=informacni-materialy--recetox-newsletter.

Other activities to raise awareness are particularly contests, popularizing activities and presentations on the activities of the COP, special events etc. Below are some examples:

National contest on synergies

National Centre for toxic compounds of Masaryk University in Brno in cooperation with the Department of environmental risks and ecological damage and the Department of international relations of the Ministry of the Environment (MoE) announced a national contest Synergy 2014 in the Czech Republic, for young people aged 14 - 25. It was held to mark the 10th anniversary since the Convention entered into force and other activities to reinforce the process of cooperation in the field of chemicals at the national level. The contest took place on www.synergie-chemie.cz/soutez. The aim of the contest was to raise awareness about the tools that protect human health and the environment from chemicals and to map eating habits of the young population in the Czech Republic and further expand awareness of the process of enhancing cooperation and coordination in the field of chemical substances among high school students.

Presentation of the activities of the Czech Republic for the international community

CR regularly informs the international community about its activities. Accompanying events held at COP4-8 (2009-2017 inclusive). It passes information about national and international activities, e.g. MONET monitoring network, electronic tools to monitor persistent organic pollutants in the environment, the results of the project as well as capacity-building programs in monitoring, laboratory capacity and expertise to implement the Stockholm Convention and the management of chemical substances in general, and the whole range of activities including sharing RECETOX training and instructional materials.

Sharing information and education on an international level

For this purpose the Czech Republic has in particular the Regional Centre of the Stockholm Convention for building capacity and technology transfer (SCRC) in Central and Eastern Europe, which is also part of RECETOX, Masaryk University in Brno and is hosted by the Czech Republic based on the official nomination of the Conference of the Parties SC-4/23 of May 2009. The Regional Centre has been supporting in long term 23 countries in Central and Eastern Europe and serves as a strategic partner to more than 30 countries in Africa and Asia. In addition to the supported countries the main partners of the Regional Centre are secretariats of the Stockholm Convention and other conventions on chemical substances, international organizations (UNEP, UNIDO, UNDP and WHO), development agencies and other stakeholders, whose activities are related to the management of chemical substances. SCRC focuses on capacity-building projects in developing countries, organizes conferences, seminars and summer schools. It also supports scientific cooperation and research project realization with partner countries and institutions in the field of chemicals management, environmental protection and human health. It allows internationally take advantage of experience, facility and expert capacity available in Brno and in the Czech Republic and contributes to improving chemicals management in partner countries and institutions dealing with environmental issues and speeding up the implementation of the Stockholm Convention and other conventions on chemicals and waste by Parties.

Principal educational activity of SCRC is the International Summer School of Environmental Chemistry and Toxicology, which RECETOX and SCRC regularly hold in June since 2005. A week-long workshop in English provides theoretical knowledge and practical skills in the field of sampling and laboratory analysis of environmental samples, analysis and interpretation of data and assessment of impacts and risks. It contributes in particular to capacity building for evaluation of the effectiveness of the Stockholm Convention and its Global Monitoring Plan. Since 2007, RECETOX collaborates in its preparation with UNEP and MoE. The Summer School in the years 2005-2016 was attended by 497 participants from 78 countries and the received information from the most significant scientific capacities in the field and practical experience are useful not only for scientists and university students, but also for employees of the state administration, supervisory authorities, workers in Analytical Laboratories industry.

Experts from the Czech Republic are also often invited as experts for research projects aimed at identifying the extent of environmental contamination, consult practical solutions to environmental decontamination and remediation, and perform risk assessments at national and international level. For example, experts from RECETOX between 2010-2014 in collaboration with UNDP, UNIDO and NATO built capacities in Armenia, Kazakhstan and Kyrgyzstan; in 2013-2015 intensively and in long term cooperated with Turkey, Bosnia and Herzegovina and Serbia; and in the years 2012-2016 for example, performed short-term training in Armenia, Brazil, China, Ghana, South Korea, Malaysia, Mali, Maldives, Seychelles, Ukraine and other countries. SCRC has been involved in the years 2016-2019 in the implementation of three major regional projects funded by GEF5 supporting the monitoring of POPs in Asia, Africa and the Pacific island states.

In addition to the activities of RECETOX it is also necessary to indicate significant activity of the CR in the field of development cooperation and assistance, which is focused also to protect the environment and in a long term to deal with the issue of chemicals. In this regard it can be mentioned for example POPs-related projects (mostly remediation) in Vietnam, the Balkans, in Africa, for example DEKONTA or Geomin and others.

Conclusions

The current level of awareness and mechanism of information exchange with target audiences at national level is fully functional and proven way to successfully and effectively ensure implementation of the Convention at the national level. This is also contributed to significantly by the latest electronic tools and information portals developed by RECETOX in cooperation with the National Centre.

In the field of education and increasing awareness the National Centre for toxic compounds is very actively involved and Czech Republic develops a wide range of activities at the international level, thus supporting other Parties and international organizations. CR manages to prepare and implement projects on POPs also within the development cooperation and assistance or capacity building and to effectively publicize the results of its work and the scientific results and applications created for

example by the Research Centre for Toxic Compounds in the Environment (RECETOX) for international organizations and decision-makers.

2.9. Relevant activities of non-governmental stakeholders

MoE records for the area of environmental education and environmental protection more than 40 non-governmental organizations operating in the Czech Republic, of which, however, only a few focus on chemicals and environmental pollution (e.g. Arnika, Centre for Environment and Health, Children of the Earth, Frank Bold, Greenpeace, the Rainbow Movement - Friends of the Earth Czech Society for sustainable living - STUŽ or Green circle). In addition to larger organizations there are a number of local organizations and initiatives dealing with specific cases, of which many concern POPs issues, such as OS Lysine (Lysá nad Labem), Association for Sustainable community development Chotíkov, For our children against the incinerator (Přerov) or Frygato-Eko (Karviná). The issue of toxic substances or wastes is addressed also by some consumer organizations (SOS Association) or Kokoza, Ekodomov, CZ Biom, as well as some of the basic organization of the Czech Union for Nature Conservation and environmental education centre. Air pollution is addressed, in addition to the already named non-governmental organizations, also by Ostrava Clear skies organization, although its focus is not directly concerned with POPs, but for instance dusts particles.
Out of nongovernmental organizations the one most dedicated to POPs is Arnika, which deals with the protection of wetlands and watercourses, reducing environmental pollution with toxic substances and waste, and encouraging public participation in environmental decision-making. It significantly collaborates with other NGOs both at the level of the Czech Republic and internationally.
Arnika Association (http://www.arnika.org) is a Czech non-profit organization founded in 2001. It has branches in the České Budějovice, Děčín, Havířov and Prague and works in three programs, of which the program dealing with POPs is mainly Toxics and Waste. Part of the international activities of Arnika is focused on helping non-profit organizations from the countries of Central and Eastern Europe, which have less experience with the conservation of nature and often difficult conditions for their work.
Arnika took part in the work of several international networks of NGOs on the issue of toxic substances and waste:

- International POPs Elimination Network - IPEN (International Network for the elimination of persistent organic pollutants) - www.ipen.org, which examines a wide range of toxic substances in the environment
- Health Care Without Harm - HCWH (Health Care without endangering) - www.noharm.org
- Global Alliance for Incineration Alternatives - GAIA (World Network for alternatives to incinerators)
- Chemicals Working Group of EEB (EEB Chemical working group).

Below is a brief overview of national activities of Arnika in the field of POPs over the last few years:

- Toxic Free Future campaign and follow-up project Citizens loud - campaign for the ratification and implementation of the Stockholm Convention and the Integrated Pollution Register (IPR), under which, among other things, Arnika annually evaluates data about POPs releases and transmissions reported by industrial plants to IPR
- Do not play with PVC - promoting alternatives to PVC in toys and products for children, health care and food packaging in terms of releases of dioxins during its liquidation
- Live Water - a project running intermittently since 2009, within which Arnika also repeatedly carried out a sampling of sediments and fish and ordered their analysis on the presence of POPs; it thus resulted in a study evaluating the burden on river sediment and fish for PBDE, HBCDD and other BFR and perfluorinated substances, including PFOS and PFOA (Lanková, Hloušková et al. 2011).
- Linked projects: Waste Management communities - examples of good practice; and Burn, Recycle - municipalities, citizens and waste
- Several projects on counselling for citizens and government on the issue of chemicals and waste
- Implementation of the EMAS system for hospitals, including measurements of POPs in the interior of selected hospital
- Heating with consideration to nature and neighbours - a project focused on prevention of domestic waste incineration in furnaces and generally on the reduction of pollutant emissions from household heating, during which materials were created to help municipalities
- Healthy planet for healthy children - a project primarily focused on sustainable consumption and environmental awareness of consumers, in which the book was "How to live well, healthy and environmentally friendly" is available in bookstores and including the advice to citizens on how to avoid exposure to POPs

In the years 2015 - 2016 Arnika among other things, dealt with the issue of pollution of the Elbe by PCB and other POPs; the operation in Hůrka near Temelín, which operates with the incinerator ashes

and metallurgy; and burden for locations in Lhenice by PCB and other POPs. Studies were created, summarizing the results of the given analyses of POPs (Mach 2016, Mach and Petrlík 2016, Mach 2017). The issue of POPs is solved by Arnika in the process of issuing integrated permits to Spolana Neratovice or hazardous waste incinerator in Kralupy nad Vltavou. In Klatovy, Arnika in cooperation with local residents helped to enforce cleanup of the old warehouse of pesticides in Luby polluted mainly by DDT and lindane (http://arnika.org/sklad-pesticidu-v-klatovech-lubech). Its restoration ended in 2012.

The program Toxics and Waste by Arnika has been hosting since 2001 the Secretariat of the Working Group IPEN (International POPs Elimination Network) for dioxins, PCB and wastes, and since 2008 IPEN coordination centre for Central and Eastern Europe (CEE). Region managed by Arnika covers the following countries: Estonia, Latvia, Lithuania, Belarus, Poland, Czech Republic, Slovakia, Hungary, Slovenia, Croatia, Serbia, Montenegro, Bosnia and Herzegovina, Albania, Kosovo, Macedonia, Romania, Bulgaria and Turkey. The older international activities worth mentioning are for instance international monitoring of POPs in eggs of hens kept at home, in which were involved non-governmental organizations from 17 countries and the results of this monitoring were as three studies presented at the COP of the Stockholm Convention: 1) The Egg Report from 2005 focused on dioxins, PCB and hexachlorobenzene (DiGangi and Petrlik 2005); 2) New Generation of POPs Evaluation lindane and PBDE (Blake 2005) and 3) last one prepared in 2009 DDT in Eggs - A Global Review (IPEN Pesticides Working Group 2009). In all three studies there are also results of analyses of samples taken in the Czech Republic. Two joint Czech-Kazakh projects in the years 2012 - 2017 ("Empowering the civil society in Kazakhstan in improvement of chemical safety" and "enforcing Citizens' rights and public participation in decision making on environmental issues - Practical Implementation of Aarhus Convention in Mangystau"); the Czech side was represented by two Arnika programs and Kazakh by organizations Ecomuseum Karaganda, CINEST and Eco Mangystau, which is partly devoted to the problems of POPs in Kazakhstan. Their specific outputs include three studies containing the results of measurements of POPs in this Central Asian country (Arnika, AWHHE et al. 2015, Arnika, EcoMuseum et al. 2015, Petrlik, Kalmykov et al. 2016).

Arnika in the years 2014 - 2016 organized for IPEN the collection of sampling and analysis of toys and articles of daily use for brominated flame retardants, which followed a similar survey for pads under carpets (DiGangi 2011, DiGangi and Strakova 2016). IPEN published the results of a study conducted in six EU countries (including the Czech Republic); Results from the Czech Republic show that exceeding the low POPs content designed to PBDE 50 ppm applied to 3 out of 12 and only to imported products. It is therefore necessary to focus on that the recycled material with a high BFR content does not get back into circulation. At the same time it is necessary to prevent the illegal movement of electronic waste so that is not returned back in this form. This should be helped, according to Arnika, by setting limits for low levels of POPs under the Stockholm Convention at the level of 50 ppm for PBDE and 100 ppm for HBCDD.

Arnika, AWHHE, CINEST and EcoMuseum (2015). Contaminated sites and their management. Case studies: Kazakhstan and Armenia. Prague-Karaganda, Arnika - Toxics and Waste Programme.

Arnika, EcoMuseum and CINEST (2015). Toxic Hot Spots in Kazakhstan. Monitoring Reports. Prague-Karaganda, Arnika - Toxics and Waste Programme.

Blake, A. (2005). The Next Generation of POPs: PBDEs and Lindane. Keep the Promise, Eliminate POPs Report, IPEN**:** 18.

DiGangi, J. and J. Petrlik (2005). The Egg Report - Contamination of chicken eggs from 17 countries by dioxins, PCB and hexachlorobenzene.

DiGangi J, S. J., Watson A (2011). "A survey of PBDEs in recycled carpet padding." Organohalog Compd **73**: 2067-2070.

DiGangi, J. and J. Strakova (2016). "Recycling of plastics containing brominated flame retardants leads to contamination of plastic childrens toys." Organohalog Compd **78**(2016): 9-11.

IPEN Pesticides Working Group (2009). DDT in Eggs. A Global Review. Keep the Promise, Eliminate POPs. Prague**:** 32.

Lanková, D., V. Hloušková, K. Kalachová, P. Hrádková, J. Pulkrabová and J. Hajšlová (2011). Výskyt perfluorovaných a bromovaných sloučenin ve vzorcích ryb a sedimentů z vybraných lokalit České republiky. Zpráva pro projekt sdružení Arnika "Voda živá". VŠCHT, Arnika 48.

Mach, V. (2016). Aktuální znečištění a šíření kontaminace perzistentními organickými polutanty z areálu skladu nebezpečných odpadů ve Lhenicích. Praha, Arnika - Toxické látky a odpady**:** 33.

Mach, V. (2017). Kontaminace perzistentními organickými polutanty a kovovými prvky v okolí zařízení k využívání odpadů Hůrka. Praha, Arnika - Toxické látky a odpady**:** 33.

Mach, V. and J. Petrlík (2016). Znečištění vodních toků perzistentními organickými polutanty ve vybraných zájmových oblastech. (Pollution of selected parts of the Czech rivers and creeks by persistent organic pollutants). Praha, Arnika - Toxické látky a odpady**:** 30.

Petrlik, J., D. Kalmykov and K. Zatloukalova (2016). Toxic pollutants in camel milk from the Mangystau Region of Kazakhstan. Results of sampling conducted in 2015–2016. Prague - Aktau, Arnika - Citizens Support Centre, EcoMuseum Karaganda**:** 50.

2.10. Technical infrastructure for POPs assessment

Overview of technical infrastructure for POPs assessment, measurement, analysis, management, research and development – linkage to international programmes and projects; Evaluation of available national expertise, instrumentation and tools that are used to monitor the incidence and trends in concentrations of POPs, research and participation in international programs in this area

2.10.1. Monitoring

POPs monitoring is required by Articles 15 and 16 of the Convention. Article 16 specifies the obligation of the Parties to reassess the effectiveness of the Convention and to set up a mechanism that will allow doing so. The result is that the effectiveness of the measures taken against POPs, is monitored based on their prevalence and trends (monitoring the changes in concentration over time) in three matrices, which were approved by decisions of the Conference. **POPs concentration is determined in the air, human tissues** (breast milk or blood) and **surface water** (only hydrophilic POPs). The Council of the National Centre for toxic compounds for the purpose of fulfilling the obligation to monitor POPs in 2008 approved and since then regularly updates **POPs monitoring concept in the Czech Republic**, which is then published on the website of the National Centre and the Ministry of the Environment:
http://www.mzp.cz/cz/strategicke_dokumenty_stockholmska_umluva) and
http://www.recetox.muni.cz/nc/index.php?pg=cinnost--podpora-vykonu-statni-spravy (only in Czech language).
When preparing this concept, among other things, the experience gained at the national level of existing international monitoring programs was taken into account (e.g. CLRTAP, EMEP and AMAP monitoring programs).
For POPs, the first inventory of occurrence in the Czech Republic was made in all components of the environment in 2003, and after the update it was included in the NIP (2006). Since then, information on individual POPs is annually updated and published on the website of the National Centre for toxic compounds http://www.recetox.muni.cz/nc/ and in particular through the information system GENASIS (http://www.genasis.cz/). This inventory covers a wider range of matrices than required by the Convention and provides for a comprehensive assessment of POPs issues in the country.
CR also has a unique and extensive experience with monitoring, including the participation in international networks (EMEP) and the operation of such a monitoring program at the international level, as indicated below in the MONET program. Since 2006 it shares their experience and knowledge with other countries and serves as an important pillar of the global POPs monitoring. In addition, the Czech Republic is developing new sampling methods, particularly for air and water environments, but also focuses on other factors affecting human health (exposome).

Monitoring POPs in major components of the environment as required by the Convention
POPs are monitored in the Czech Republic in the long term in all matrices, which are required by the Convention and the Czech Republic manages to meet the requirements of the Convention. In addition, POPs are monitored also in other parts of the environment. Below are listed information on POPs monitoring in the basic matrices and the key programs monitoring the presence of POPs.

Air
In the air are monitored POPs listed in the Convention and the Protocol on POPs within EMEP programs, MONET_CZ, MONET_EU and System Health Monitoring Czech Republic in relation to the environment.
Within EMEP it is active monitoring, sampling of the ambient air is conducted once a week for 24 hours. Monitoring is performed since 1988. Samples taken by active sampling are periodically analysed for organochlorinated pesticides (OCP), polychlorinated biphenyls (PCB) and polyaromatic hydrocarbons (PAH). Since 2011, in addition, they are analysed for concentrations of polychlorinated dibenzo-p-dioxins and furans (PCDD/F), cyclodiene pesticides, dioxin-like polychlorinated biphenyls (dl-PCB) and polybrominated diphenyl ethers (PBDE). With the development of analytical methods the determination of perfluorinated compounds (PFC) was also introduced in 2012 and 4 isomers of hexabromocyclododecane (HBCDD) in 2013.
Within the MONET_CZ program (since 2003) a long-term passive monitoring of POPs has been conducted at 32 sampling points (after 28 days) and monitors chlorinated pesticides (PCB, HCH, DDT, HCB, PeCB and PAH). Another program of passive air sampling is MONET_EU. In the Czech Republic there are three sampling points (Košetice, Prague-Libuš, Svratouch) from 2012 sampling

lasts 84 days and OCP (9 is determined from 2012) and also the content of PCDD/F, dl-PCB, PBDE, HBCDD and PFC is monitored. Determination of 4 isomers of hexabromocyclododecane (HBCDD) was launched in 2013. Data obtained in MONET programs are listed on the website www.genasis.cz. More information about MONET programs are listed on the website www.monet.recetox.muni.cz.

Human tissue

System of Public Health Monitoring (http://www.szu.cz/publikace/monitoring-zdravi-a-zivotniho-prostredi?lang=1) is a coordinated system of data collection on the quality of environmental components, which represent the direct route of human exposure to harmful health factors and the assessment of their impact on the health of the Czech population. The system has been implemented since 1994 under the Decree of the Government of the Czech Republic No. 369/1991 Coll., it is contained in the Act on Protection of Public Health No. 258/2000 Coll., as amended, and is one of the priorities of the Action Plan for Health and the Environment of the Czech Republic, which was approved by Government Decree No. 810/1998 Coll. National Institute of Public Health publishes an annual summary report in which the monitoring results are listed. Reports are available in Czech and English (http://www.szu.cz/tema/zivotni-prostredi/odborne-zpravy-1).

As part of regular monitoring of POPs in the Czech Republic, individual samples of breast milk are collected (max. 200 respondents). For the study of WHO one composite sample for the Czech Republic is taken, consisting of donations from 50 mothers. The range of defined POPs in both programs is different.

The individual samples that were collected since 1994 under the System Health Monitoring Czech Republic in relation to the environment (coordinator - NIPH) have always been monitored concentrations of OCP (PCB, sum of DDT, HCB). Since 2009, the range of controlled substances was increased. Some archived samples were then re-assessed also for brominated flame retardants and polyfluorinated substances.

The Czech Republic has also repeatedly participated in the UNEP-WHO studies of breast milk: study No. 2 in 1992-1993 - PCB and dioxins, No. 3 in 2000-2003, No. 4 in 2004-2007 and No. 5 in the year 2014. Analyses of these samples occur only in two reference laboratories in the world (FVUA Freiburg, all POPs except PFOS) and Örebrö (only PFOS). Data for all states involved in the sampling campaigns of UNEP-WHO until 2014 are stated in the global POPs monitoring database, www.pops-gmp.org.

At EU level since 2014 there is an effort to reconcile all biomonitoring activities, at which the Czech Republic participates at NIPH and National Centre and for the years 2017-2020 will be implemented within the framework of the project implementation **HBM4EU**.

Water

In 2009, PFOS-based compounds were included in Annex B of the Convention. Since they are water-soluble compounds, it was recommended to Parties in the decisions of the Conference (SC - 5/18, 6/23, 7/25) to initiate the monitoring of these substances in the surface water.

In the Czech Republic PFOS are monitored in surface waters since 2016. As an indicator for assessing ecological status they were determined in 2011[71]. In water also other POPs are monitored during the evaluation of the chemical state of surface waters (implemented by the River Basin enterprises): aldrin, endrin, dieldrin, heptachlor, HCB, HCH, pentachlorobenzene, endosulfan, HBCDD, PCP, HCB, DDT, PFOS. In biota, to evaluate the chemical status (performed by CHMI) brominated diphenyl ethers (congeners 28, 47, 99, 100, 153 and 154), HCB, HCBD, PFOS, HBCDD, heptachlor and PCDDs, PCDFs and dioxin-like PCB (12346789OCDD, 1234678HpCDD, 1234789HpCDF, 123478HxCDD, 123478HxCDF, 123678HxCDD, 123678HxCDF, 123789HxCDD, 123789HxCDF, 12378PeCDD, 12378PeCDF, 234678HxCDF, 23478PeCDF, 2378TCDD, 2378TCDF, PCB 105, 114, 118, 123, 126, 156, 157, 167, 169, 189, 77 81) are monitored. Other substances are tracked in solid matrices (sediments and biota, realized by CHMI) for the assessment of trend concentrations in sediment or biota (point 5. of the Annex No. 2 to Government Regulation 401/2015 Coll.). The Czech Hydrometeorological Institute implements groundwater monitoring, among others, for these POPs: HCH, DDT, PCB (28, 52, 101, 118, 138, 153, 180) and PFOS.

All data is collected online via IS-ARROW, Information System of Assessment and Reference Reports of Water Monitoring in the CR. Information is available on the website of the Czech Hydrometeorological Institute (http://hydro.chmi.cz/pasporty/pasport.php?seq=3287509&mf=10).

National Centre for toxic compounds is actively involved in the preparation of the global network of monitoring surface water Aqua GAPS (http://www.aqua-gaps.passivesampling.net/).

[71] amendment of the Government Regulation 61/2003 Coll. = Government Regulation No. 23/2011 Coll.; Government Regulation No. 61/2003 Coll. was replaced the Government Regulation No. 401/2005 Coll. with the same name

Monitoring of POPs in other matrices

Soil, sludge, sediments

Basal monitoring of agricultural land is carried out on the basis of Act No. 156/1998 Coll. amended[72] and Act No. 147/2002 Coll.[73] It lies in monitoring the physical and chemical parameters of the soil on permanent monitoring plots by permanent procedures. The system was established in 1992. Currently it is operated at 214 locations.

Within Basal soil monitoring with respect to POPs monitoring, soil samples are taken from 40 locations annually. In samples the following POPs are determined: HCH isomers, HCB, DDT compounds of group (o´,p´- and p´p´- DDT, DDE, DDD), PCB (7 congeners - 28, 52, 101, 138, 153, 180), and 16 EPA PAH.

To monitor the quality of entry into the soil and to establish the safety of food production, sediment samples (20) and sludge (80) are regularly monitored. In the case of sediments to the already mentioned list of POPs there are added also PBDE/polybrominated flame retardants (10 congeners: 28, 47, 66, 85, 99, 100, 153, 154, 183). In the case of monitoring the quality of sludge, attention is focused on the wastewater treatment plant, from which at least part of the production goes directly to agricultural land, or is provided as a raw material into compost. In addition to the basic "sets" of POPs the following POPs are determined in sludge since 2010 - PBDE (10 set congeners) and since 2013 the selected perfluoroalkyl compounds (PFHxA - perflurohexane acid, PFHpA - perfluoroheptane acid, PFOA - perluorooctane acid, PFNA - perfluorononane acid, PFDA -perfluorodekane acid, PFOS - perfluorooctasulphonan).

In 2015, the determination of PBDE was taken in 12 samples of sludge. The average PBDE content in the sludge that year amounted to 28.6 $\mu g.kg^{-1}$ of dry matter, median of 20.9 $\mu g.kg^{-1}$ of dry matter (DM). From the sum of 9 PBDE congeners approximately 2/3 share is for congeners 99 (40 % of the total PBDE) and 47 (31 %). These congeners were also dominant in the entire set of previously analysed samples. The range of PFOS in 21 samples of sludge in 2015 amounted to 0.29 - 1090 (!) $\mu g.kg^{-1}$ DM, (average of 58.01 $\mu g.kg^{-1}$ DM).

The results of monitoring of contaminants in the soil but also in food chains are processed each year through the annual report and posted on the website of the Institute: http://eagri.cz/public/web/ukzuz/portal/hnojiva-a-puda/publikace/bezpecnost-pudy-zpravy/monitoring-pud/kontrola-a-monitoring-cl/.

POPs in transport

PCDD, PCDF and PCB emissions from traffic are in the orders of milligrams. They are mostly produced by older vehicles, not complying with EURO standards. Decreasing trend in production of this traffic emission is given by replacement of vehicles especially in individual traffic. However, the database of emission factors CORINAIR does not provide information, if these emissions are bound to so called halogen carriers or if they arise from trace amounts of chlorine in fuels. Another possibility of their formation is the presence of traces of chlorinated volatile organic compounds in the air (from solvents). Under the conditions of combustion in vehicle engines PCDD, PCDF and PCB may also arise of these substances present in the feed air. Emission factors of PCDD and PCDF are very low, in orders of $pg.km^{-1}$, therefore the origin of this minimum amounts is probable also by combustion of fuel, which does not contain halogen carriers. This assumption is also supported by the fact that a part of database is emission factors of diesel fuel vehicles, for which halogenated ingredients were not used. PCB emission was measured in vehicles with ignition engines, and therefore they are reported only for individual transport. In addition, non-zero emission factors were measured in a number of vehicles, in the fuels of which halogen blowing agents were not present. The resulting emissions are shown in Figures 2 to 5. The extent of the presence of flame retardants in vehicles is not known. PFOS and related substances (e.g. perfluoroctasulphonamides – PFOS, perfluoroctanacetes - PFOA) were also developed for the treatment of interiors of transport vehicles.

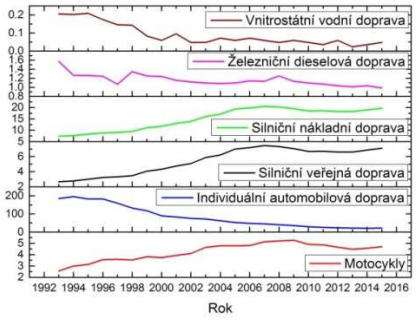
POPs content in foods and in selected veterinary commodities

The evaluation of contamination of food baskets in the Czech Republic regularly takes place since 1994 or 1996 for most POPs listed in the Convention within the Public Health Monitoring System in the Czech Republic in relation to the environment (subsystem IV) program SAMPLEMON (sampling food representing a typical mix of foods of the CR population). Data are annually issued in the form of an annual summary report, which is published by the National Institute of Public Health. Reports are available in Czech and English language http://www.szu.cz/tema/zivotni-prostredi/odborne-zpravy-1.

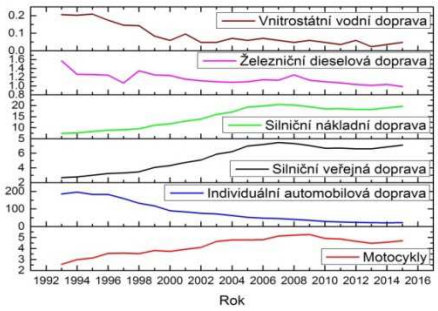
[72] Act of 12 June 1998 on fertilizers, supplementary soil substances, supplementary plant preparations and substrates and agrochemical testing of agricultural soils (Act on Fertilizers)

[73] The Act of 20 March 2002 on the Central Control and Testing Institute of Agriculture and on amendment of certain related laws (the Central Control and Testing Institute in Agriculture)

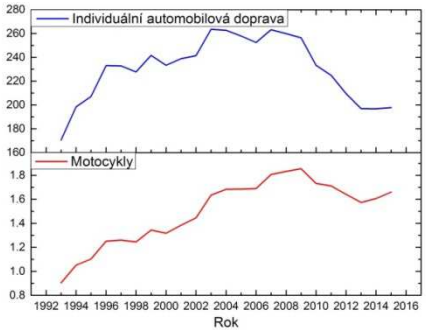
PCDD



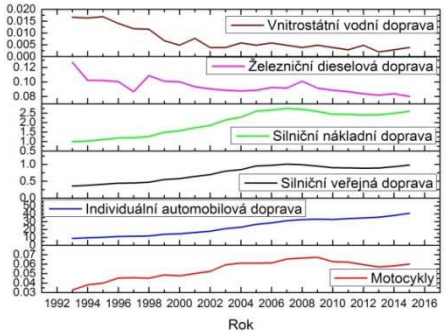
PCDF



PCB



PAH



Charts 2-5: Total emissions of PCDD/F, PCB and PAH from traffic in the Czech Republic

Sampling food in the period 2014-2015 was implemented in 32 quota-selected settlements with regard to number of population, divided into 4 territorial regions (quadrants). In each selected headquarters the sampling was carried out in three different grocery stores so that it complied with the proportional representation of the size of stores by actual consumer preferences. The number of sampling points is based on the capacity/funding options to follow-up on the previous system and the sampling is representative of the country's territory. During the two-year monitoring cycle, samples were taken at 96 different stores at 8 times so as to include the anticipated seasonal changes in food supply.

A representative set of samples of food for the usual diet in the Czech Republic is concentrated in one place in the country where they are prepared in a culinary standard, and immediately analysed for selected chemicals. Since 2004, the dietary exposure monitoring is conducted in two-year cycles. Food sampling system represents a real food diet of the population in the Czech Republic (selection of foods includes over 95% of the average Czech diet). The number of samples is representative of the whole country, but not enough to compare regional differences; the sampling volume is limited by the available financial resources.

A set of food samples provided for chemical analysis consisted of a two-year period from over 205 different types of food (i.e. TDS food list), taken from a collection of 32 different shopping places in the country. The total number of samples of food (some species are taken repeatedly and in several department stores) was 3696 per country in 2 years. The number of individual chemical substances quantified in food samples was 114 (including fatty acids and vitamin D), often forming a group of related compounds with similar health effect. Not all of the analysed substances can be evaluated now, because monitoring is carried out over a longer period of time.

Standard analysis of OCP and PCB, PCDD and PCDF exposure is performed only when sufficient funds for analysis are available.

Given that this information is of great importance for the interpretation of data obtained by monitoring human matrices, they should be made available to decision makers through IPCHEM. The Czech Republic should ensure data sharing on a national and European level e.g. in the European database IPCHEM (see chapter *2.10.3. POPs Research in the Czech Republic,* Project HBM4EU).

Evaluation of the exposure of the Czech populations to the POPs

Evaluation of the exposure of the Czech populations takes place regularly in the program SAFEMON (subsystem IV).

National Institute of Public Health publishes an annual summary report in which the monitoring results are listed. Reports are available in Czech and English language at:
http://www.szu.cz/tema/zivotni-prostredi/odborne-zpravy-1.

In the monitoring period 2014-2015, for the estimate of conventional exposure doses two values of expected consumption of food were used: the true value of food consumption among respondents of a national epidemiological study (SISP04), which provides individual values and average food intake per

capita in the Czech Republic in 2003-2004 and for the assessment of the trend of conventional exposure, then the value of food consumption model based on recommended doses of foodstuffs for the Czech Republic (i.e. food pyramid). The observed concentrations of chemicals, for which the measurement cycle was completed, were used to calculate average exposure doses for the Czech population in 2014-2015. For long-term comparison of exposure doses from 1994 the model of recommended doses of foodstuffs for the Czech Republic was used, which is calculated for typical 5 population groups (children, men, women, pregnant/lactating women, and the elderly).

Conclusions

The Czech Republic has unique experience and data in monitoring. In the various components of the environment there is monitoring of POPs done since 1988, or since the mid-90s.

Monitoring of air by active sampling is done since 1988. Since 1994, there are regularly collected 52 air samples annually and since 2012 it has been analysed for all the POPs listed in the Convention and even some of the candidate substances. Since 2003 a network of passive sampling MONET_CZ has also been established, where since 2003 the following POPs are regularly monitored: PCB, HCH, DDT, HCB, PeCB and PAH, and since 2012, in addition, at three locations of the network (Košetice, Libuš, Svratouch) the following is monitored: PCDD/F, dioxin-like PCB (dl PCB), PBDE, HBCDD and fluorinated compounds (PFC). All information obtained is published in GENASIS.

To optimize national network MONET National Centre won a research project BETA TAČR CR (TAČR - MONETPOP) for the period 2013-2015. Currently, the operation of the network MONET is supported only by RECETOX research infrastructure.

In the Czech Republic there is also the sampling of surface water and some POPs are already monitored. Following the legislation (implementation of the Water Framework Directive and the obligation to determine PFOS as a priority substance from 2013) the amount of information increases. Moreover, in CR there is irregular monitoring spatially locally and institutionally in the other matrices (soil, atmospheric deposition biota, substances in the food basket). The scope of certain substances, sampling frequency and sampling points are different, but even this information is an important contribution to the national inventory of POPs.

Long-term monitoring of POPs in human matrices is implemented in the Czech Republic since the 90s. Breast milk and its contamination by selected POPs are monitored regularly since 1994, with a limitation of number of samples and types of substances from 2011. The scope of analysis depends on project financing. The results are published on the NIPH website and in specialized magazines. In 2014 the Czech Republic for the fourth time participated in the UNEP-WHO studies on the content of POPs in breast milk.

Based on data collected in the MONET program of long-term integrated monitoring of POPs in Košetice can be said that levels of POPs in pesticides in the long-term decline significantly, although those for DDT + metabolites and HCB are still measurable.

For new POPs in air during the years 2014 and 2015 when determining polybrominated diphenyl ethers, of which the tetra- to decaBDE are listed in Annexes of the Stockholm Convention (decaBDE was listed in 2017), it was shown that there is indeed a reduction in the incidence of these substances and that the implemented measures are effective. The most commonly detected congener was BDE 209, which is the main component of technical mixtures of decaBDE. On the other hand, there is an incidence of new brominated flame retardant NBFR (novel brominated flame retardants), which are used as a substitute PBDE.

Comparing the results of the internal and external environment it has been shown that the source of PBDE may be especially electronics, while building materials and furniture were not in this case proven as a source of PBDE. The total concentration of diphenyl ethers are currently negligible, compared with other flame retardants. Significantly higher concentrations were found in NBFR, in which case next to electronics, furniture was also a verifiable source. Equally significant flame retardants in the sampled air were also HBCDD the source of which is clearly building materials, other monitored sources were not proven.

Long-term individual data in breast milk indicate a continuing downward trend in concentrations of POPs in the environment and clearly demonstrates the effectiveness of measures and restrictions on the use of POPs in the CR. In the last composite sample for the Czech Republic (taken in 2014) the following components of the original POPs were not found - aldrin, endrin, chlordane, mirex, toxaphene, and new POPs - HBB, alpha- and gamma-HCH, endosulfan, PeCB. In the case of aldrin, endrin, mirex, toxaphene, endosulfan, alpha HCH the absence in the sample is repeated. For the first time chlorinated paraffins with short chain (SCCP) and hexabromocyclododecane including its isomers (HBCDD) were also analysed.

With respect to food contamination and population exposure rate the extent of exposure of the Czech population estimated according to actual consumption of food (SISP04) reached a low exposure doses - e.g. less than 0.1% of the tolerable intake (TDI) for the sum of DDT, less than 0.1% of the acceptable daily intake (ADI) for lindane, 0.3 % of the tolerable intake (TDI) for hexachlorobenzene. The results confirm the persistent global contamination of food by these POPs, but at low

concentrations, which according to current knowledge, do not pose a significant health risk if they are assessed as individual chemicals and not in mixtures (http://www.szu.cz/uploads/documents/chzp/odborne_zpravy/OZ_15/Odborna_dieta_2015.pdf).
In connection with the adopted Concept of POPs monitoring the national monitoring network MONET is interconnected with existing international monitoring programs under EMEP and AMAP. In 2009, some stations from MONET_CZ network were included in the MONET_Europe monitoring network for passive air monitoring. The part of the network is also a Central European background station Košetice (Czech Hydrometeorological Institute in cooperation with the National Centre), which participate in monitoring programs for air: EMEP, MONET and GAPS.

2.10.2. Identification of POPs releases

Leaks (sources) of POPs can be found mainly from IPR registry (resp. E-PRTR). The substances monitored within IPR, which are listed in the Convention are: aldrin, dieldrin, endrin, heptachlor, chlordane, chlordecone, HBB, HCB, HCBD, lindane, mirex, PCB, toxaphene, PeCB, PCP, DDT, PCDD + PCDF (dioxins + furans), PBDE, HCH (alpha and beta), endosulfan, perfluorocarbons (PFC) and chloroalkanes (C10 - C13), see table 9. The Government Regulation No. 450/2011 Coll.[74] limit the number of the reported substances in waste transmitted offsite from the original 72 to 26 (i.e. adapted Appendix No. 2 of the Regulation). For substances listed in the Convention, the handover of information on the transfer in waste only concerns the following: HCB, PCB, PCDD/PCDF and respectively naphthalene.

Conclusions
The introduction of measures against releases of POPs into the environment is possible in the event that such leakage is well known. IPR registry information on leakages of the listed POPs is valuable and often the only source of information on possible sources of origin and their occurrence in the environment. The decreasing or increasing in the number of reported substances in this register would then be approached only after careful consideration of all circumstances and some already retired reconsider the reinstatement.

Table 9: Releases of POPs monitored in the IPR, respectively E-PRTR

The Stockholm Convention	Name in E-PRTR and/or IPR	Regulation about the E-PRTR Releases to:			Government Regulation on IPR	Note
Name of substance		air	water, trans-missions in waste-water	soil	Trans-mission in waste-water	
Aldrin	Aldrin	1	1	1	X	
Chlordane	Chlordane	1	1	1	X	
DDT	DDT	1	1	1	X	
Dieldrin	Dieldrin	1	1	1	X	
Endrin	Endrin	1	1	1	X	
Heptachlor	Heptachlor	1	1	1	X	
Hexachlorobenzene (HCB)	Hexachlorobenzene (HCB)	10	1	1	1	
Mirex	Mirex	1	1	1	X	
Toxaphene	Toxaphene	1	1	1	X	
Polychlorinated biphenyls (PCB)	Polychlorinated biphenyls (PCB)	0.1	0.1	0.1	1	
Polychlorinated dibenzo-p-dioxins (PCDD)	PCDD + PCDF (dioxins + furans) (as TEQ)	0.0001	0.0001	0.0001	0.001	In the E-PRTR and IPR it is monitored along with the PCDF.
Polychlorinated dibenzofurans (PCDF)	PCDD + PCDF (dioxins + furans) (as TEQ)	0.0001	0.0001	0.0001	0.001	In the E-PRTR and IPR it is monitored along with the

[74] Government Regulation of 21 December 2011, modifying the Government Regulation No. 145/2008 Coll., laying down the list of pollutants and thresholds and data required for reporting to the Integrated Pollution Register in the wording of later regulations

The Stockholm Convention	Name in E-PRTR and/or IPR	Regulation about the E-PRTR Releases to:			Government Regulation on IPR	Note
Name of substance		air	water, trans-missions in waste-water	soil	Trans-mission in waste-water	
						PCDD.
Hexabromobiphenyl (HBB)	Hexabromobiphenyl	0.1	0.1	0.1	X	
Pentabromodiphenyl ether (PeBDE)	Brominated diphenyl ethers (PBDE)	X	1	1	X	The E-PRTR and IPR monitored as a whole - i.e. Brominated diphenyl ethers. Tetrabromodiphenyl ether (teraBDE) and pentabromodiphenyl ether (pentaBDE) are the main components of commercial pentabromodiphenyl ether.
Octabromdiphenyl ether (octaBDE)	Brominated diphenyl ethers (PBDE)	X	1	1	X	The E-PRTR and IPR monitored as a whole - i.e. Brominated diphenyl ethers. Hexabromodiphenyl ether (hexaBDE) and heptabromodiphenyl ether (heptaBDE) are the main components of commercial octabromodiphenyl ether.
Pentachlorobenzene	Pentachlorobenzene	1	1	1	X	
Lindane	Lindane	1	1	1	X	
α-hexachlorocyclo-hexane	1,2,3,4,5,6-Hexachlorocyclo-hexane (HCH)	10	1	1	X	In the E-PRTR and IPR it is monitored as a whole - i.e. 1,2,3,4,5,6-Hexachlorocyclo-hexane.
β-hexachlorocyclo-hexane	1,2,3,4,5,6-Hexachlorocyclo-hexane (HCH)	10	1	1	X	In the E-PRTR and IPR it is monitored as a whole - i.e. 1,2,3,4,5,6-Hexachlorocyclo-hexane.
Chlordecone	Chlordecone	1	1	1	X	
Perfluorooctane sulfonate (PFOS), its salts and perfluorsulfonylfluorid	X	X	X	X	X	In the E-PRTR and the IRP it is not covered. There are there only perfluoro-hydrogens.
Technical endosulfan and its isomers	Endosulfate	X	1	1	X	
Hexabromcyklo-dodecane (HBCDD)	X	X	X	X	X	
Pentachlorophenol and its salts and esters	Pentachlorophenol (PCP)	10	1	1	X	In the E-PRTR and IPR there are probably not covered PCP salts and esters.

The Stockholm Convention	Name in E-PRTR and/or IPR	Regulation about the E-PRTR Releases to:			Government Regulation on IPR	Note
Name of substance		air	water, trans-missions in waste-water	soil	Trans-mission in waste-water	
Polychlorinated naphthalenes	Naphthalene	100	10	10	100	In the E-PRTR and IPR it is monitored as a whole - i.e. naphthalene.
Hexachlorobutadiene	Hexachlorobutadiene (HCBD)	X	1	1	X	

2.10.3. POPs research in the Czech Republic

Research on POPs in the Czech Republic has been done in long-term, systematically since 1983. A significant expertise, at least at the European level, can be found in the RECETOX centre of the Masaryk University. Its research on POPs links short-term laboratory experiments with long-term field studies, leading to a broader understanding of the mechanisms of environmental processes influencing emissions and fate of chemicals in the external and internal environment and related human exposure. To study the behaviour, distribution and transfer of chemicals, exposure and associated risks is used sensitive sampling techniques and analytical methods, and uses laboratories accredited according to DIN 17025. The data obtained are used for database systems development, testing deterministic and stochastic models suitable for analysis of relationships, predicting environmental changes and impacts, and support of decision-making processes. Research in recent years has been focused on connections with other disciplines, and so in addition to the traditional POPs monitoring the occurrence of substances in the environment; attention of research groups is focused on the exposure of the human population to complex chemical mixtures. New screening method are developed for targeted and untargeted analysis of emergent substances and their mixtures in the samples of the internal and external environments, water, food and consumer products in order to characterize typical toxic mixtures for inhalation, dermal and dietary exposure. Such large-scale screening is combined with biomonitoring of human tissues and laboratory models able to predict the distribution of controlled substances in the human body.
RECETOX research collaborates with many partners, whether in science abroad, but often also from application sector - national and regional governments, industry and small businesses with international organizations.
Cooperation with industry lies also in the joint development of new technologies and instruments used in everyday life. Specific examples may be the long-term cooperation with BAGHIRRA s.r.o., which produces various types of air samplers with which RECETOX cooperates on innovations and in 2015 an application was made for a patent and industrial design. A second example could be a biosensor, a mobile device that can be used with continuous detection, and lower cost of operation for the monitoring of certain chlorinated toxic substances in the environment and in industrial plants or remediation of contaminated sites.
Cooperation with regional authorities in the years 2007-10 was supported by means of R&D project of MoE and focused on the monitoring of air contamination in all regions of the POPs type of substances and monitoring of local sources of pollution (primary and secondary, point and diffuse). After 2010, the number of regions involved in regional monitoring has been declining steadily and from 2014 onward this long-term monitoring takes place only in the Southern Moravia Region. The information obtained through this cooperation serves to the region as a basis for decision-making and is available in addition to regular annual reports also in the database GENASIS (www.genasis.cz).
In addition, in the RECETOX there are annually carried out research works that monitor levels of transmission between different components of the environment - to monitor air, soil, water and surroundings of landfills (e.g. Nagy, Michael - Bachelor thesis: Large landfills as a source of environmental contamination (2012), Jitka Tobišková - Thesis: Monitoring of toxic substances in the area of hazardous waste landfills in the Czech Republic and Slovak Republic (2016), Martina Vykoukalová - Thesis: Global distribution of organic pollutants in the aquatic environment (2016), Michaela Nagyová: Thesis: Monitoring of landfills (2014)). These works focus mostly on assessing the levels or amounts of substances that are released into the environment.

Below are examples of important projects related to POPs, which take place at Masaryk University, in cooperation with various partners:

Since 2004, scientists from RECETOX coordinated two projects of the 5th Framework Program (5th RP), attended three projects of the 6th RP and eight research projects of the 7th RP (isoSoil, ArcRisk, AquaRehab, EuroEcotox, this, REFORM, DENAMIC and Solutions) and one project of the International Network Marie Curie training for aspiring scientists (CSI Environment); of which isoSOIL, ArcRisk, DENAMIC, Solutions and CSI Environment are related to POPs.
Two projects of cooperation between the regions of the EU focused on cross-border cooperation between the Czech Republic and Austria and the Czech Republic and Slovakia:
Monairnet - (M00124) - The main objective of the project was to strengthen cross-border cooperation between the Czech Republic and Austria regarding the assessment of the burdening of the open air by persistent organic pollutants (POPs) using coordinated monitoring. A common monitoring network was established with one year monitoring programme. The most advanced sampling techniques and procedures were applied. At selected locations of South Moravian Region, Vysočina region, Southern Bohemia Region, Lower Austria and Upper Austria (20) were installed passive samplers based on polyurethane foam, new patent protected samplers of atmospheric deposition, a unique multicast bulk (HiVol) sampling pump and a collection needles were performed. The samples were analysed for the content of polycyclic aromatic hydrocarbons (PAH), polychlorinated biphenyls (PCB), organochlorine pesticides (OCP), polybrominated diphenyl ethers (PBDE), perfluorinated compounds (PFC) and polychlorinated dibenzodioxins (PCDD) and furans (PCDF). The results obtained, particularly from the unique active samplers, which are able to take samples of the air according to the prevailing flow of air masses, can help detect regional and distant sources of POPs pollution. Comparative data of POPs concentrations was obtained in the ambient air for the whole area. This network was also linked to the existing large-scale monitoring network (EMEP, MONARPOP, MONET).
Needlenet project is supported from the Operational Program CBC Slovak Republic - Czech Republic (CZ/FMP.16/0379) in 2014. The project participants are the High Alpine Research Institute of Biology (VUVB), which is located in the Tatra Javorina and is a scientific institution of Žilina University and Research Centre for Toxic Compounds in the Environment (RECETOX, Masaryk University). The main objective of the project Needle-net is an intensive cooperation and implementation of a pilot study based on cross-border cooperation between the two institutions. Professional micro-project goal is to research and validate new methods for determining the burden of the ambient air using a biomonitoring sample matrix of needles of a Mountain pine (Pinus mugo Turra.) and Scots pine (Pinus sylvestris L.). Attention is focused on determining a burden due to POPs, heavy metals and monitoring the level of genotoxicity evaluated using the test of abortivity of pollen for selected locations for Large and Small Fatra mountains, Low and High Tatras mountains. The data obtained is then used to refine any existing European model of distribution of these types of pollutants. The results will be included in the system GENASIS and will be provided to the general public, local and regional government, legislators, environmental agencies and NGOs. A partial aim of the whole micro-project is the transfer of expertise and technology between experts of RECETOX and the High Alpine Research Institute of Biology, thereby establishing a basis for further cooperation between the two countries. For the project needs 26 sampling sites located on the territory of the Slovak Republic were chosen in Žilina, Trenčianské, Banska Bystrica and Prešov regions. Site selection was conditioned by bedrock of selected mountain ranges, compass orientation, altitude and the potential for long-range transmission. Remote transmission may transmit air pollutants to the monitored area of southern Poland and the Moravian-Silesian Region of the Czech Republic, where industrial production is intense.
Development and implementation of a national monitoring network for long-term monitoring of persistent organic pollutants in ambient air in the Czech Republic using passive sampling (MONETPOP, TB010MZP057) - the aim of the project is the operation of the national monitoring network for long-term monitoring of POPs in ambient air in the Czech Republic by means of passive sampling method and its optimization. The monitoring network provides data suitable for assessment of spatial and temporal trends in the incidence of POPs in air of the Czech Republic. Partial result of the project is a certified methodology of application of passive samplers in the long-term monitoring of POPs levels in ambient air in the Czech Republic (Nmet) and also the set of certified maps with professional content (Nmap). The project was designed with the financial support of the Technology Agency of the CR in BETA program.
TAČR BETA - ASSESSPOP Development of the system for evaluating spatial relationships environmental contamination (TB010MZP058, period January 2013 - December 2015) - project supported the completion and operation of information repositories including presentation portal system GENASIS in 2013-2015. Its goal was to complete the multifunctional repository of environmental data, which serves as a tool for analysing the occurrence of POPs in the environment and also to create a set of interactive maps that are certified as maps with professional content (Nmap) basis for strategic non-legislative documents (Hneleg). The created repository enables monitoring of temporal and spatial relations and visualizations of the occurrence of POPs in the Czech Republic in the form of graphs and maps. It is a source of data for the use in other professional reports and also a validated source of reports to fulfil its obligations under Articles 7 and 15 of the Convention and the provisions of Articles 9 and 12 of Regulation (EC) No. 850/2004. By means of this project, the

Czech Republic fulfils certain provisions of its updated National Implementation Plan. The project was designed with the financial support of the Technology Agency of the CR in BETA program.

TAČR BETA - EMERTOX Emergent pollutants in the environment (TB030MZP001, November 2014 - December 2016) - supported the monitoring of selected emergent substances in the environment and prepared the methodology and certified maps (especially for brominated flame retardants, HBCDD, PFOS, PFOA) in that period. The subject of the project was researching the use of a combination of chemical and toxicological methods to gain a deeper understanding of the extent of the problem of the environment and human exposure to emergent pollutants from various sources at the national level. The project results in several methodologies for monitoring of emergent substances in the aquatic environment and the internal environment (Nmet) and certified maps. The result of the project was reflected also in strategic documents of non-legislative nature, especially the update of NIP and national implementation of the European Water Framework Directive. The project was designed with the financial support of the Technology Agency of the CR in BETA program.

TACR BETA - flame retardants. Flame retardants in products and internal environment in the Czech Republic (TB03MZP003, 7/2015-12/2016). The aim of the project was to obtain preliminary screening data for the period July 2015 - December 2015. The core group identified the products as the main source of flame retardants, and other matrices were merely additive (how and where substances penetrate from their source). It was focused on a group of flame retardants, but not limited to substances already listed in the Annexes to the Stockholm Convention, but also some of their substitutes in order to assess the rate at which the products and in the environment contain the old (forbidden) and newly produced substances (flame retardants). The project was designed with the financial support of the Technology Agency of the CR in BETA program.

Planet ERA - ERA-PLANET - The European network for observing our changing planet (ERA-PLANET, 689 443 for the period 2/2016 - 1/2021 - This project is supported by the Horizon 2020 program - Climate action, environment, resource efficiency and raw materials (Societal Challenges). For this project, ERA-Planet - European Network for observation of the changing planet, a network of 36 partner organizations from 15 European countries was created. The project aims to strengthen the European Research Area in the field of Earth observation and to strengthen the EU's position on the activities of the Group on Earth Observations (GEO) and Copernicus program. The project will provide accurate, comprehensive information and support in four areas: Smart Cities and sustainable society; Efficient use of resources and environmental protection; Global change and international environmental conventions; Polar areas and natural resources. In addition, the ERA-PLANET will provide advanced decision support tools and technology, which better tracks global environment and share information and knowledge from other areas of earth observation.

Part of the global changes and international agreements should contribute in particular to increase the availability and quality of Earth observation data and information required to monitor persistent organic pollutants (POPs) and mercury and based on the data predict changes in the global environment. More information about the project is on http://eraplanet.meteo.noa.gr.

HBM4EU (European Human Biomonitoring Initiative) It is a project submitted by a consortium of 26 countries in the framework of Joint Programming within the program HORIZON 2020 in 2016. The project is initiated by the European Commission to create a single European platform for human monitoring for the years 2017-2021. The project is co-financed by 70 % of the EU funds and implementation was launched in January 2017. The subject of the project is nine chemical classes: the phthalates and their replacements, retarder/flame retardants (not brominated), bisphenol, perfluorinated compounds, chromium and cadmium, polyaromates in relation to atmospheric contamination emergent agents, toxic agents and anilines. During 2015, for each of the nine groups of priority chemical substances detailed inventory of capabilities, data and knowledge were created at the EU level. In the CR in October 2015 the National Panel on human monitoring was established (HBM4CZ) as a national expert and institutional structure for the long term and sustained involvement of the Czech Republic in European initiatives to biomonitoring. The Panel is subordinated to the Council of the National Centre for toxic compounds and ensures the transfer of information from science to politics, responds to the requirements of decision-makers in the Czech Republic (raised by the Council of the National Centre) and at the national level handles priority issues in connection with the implementation HBM4EU in the Czech Republic, enforcing utilization of Czech capacities at the EU level, and will also transfer knowledge from European (project) level to the national level. Members of the national panel are mainly scientists and experts in human monitoring and monitored priority substances in accordance with HBM4EU, but also representatives of key ministries and other stakeholders. Project HBM4EU allows the Czech Republic 70 % co-financing of activities related to biomonitoring, i.e. the actual biomonitoring of the population, support of running epidemiological studies, better exploitation of available information from national registries, medical databases and data from national monitoring and environmental monitoring, while enabling disclosure of information to the decision-making sector and ministries and in such form as that it is possible to work with them comprehensively in the case of the creation of national strategies, policies and legislation. If they are

used, it can greatly help to refine the national priorities in legislation on health and the environment, and to identify trends and research needs, in which it is necessary to obtain more information.

Conclusions

The Czech Republic is a major player in research of POPs and it has been doing so in the long term. A significant expertise, at least at the European level, can be found in the RECETOX centre of the Masaryk University. This centre is also very significantly involved in the international cooperation and actively cooperates not only with other research institutions, but also with partners from industry and application sectors. In the years 2010-2016 at the national level scientists of RECETOX participated in solving more than 40 research projects funded by the Ministries of Environment, Education, Youth and Sports, Agriculture, or Health, Grant Agency and the Technology Agency of the Czech Republic and industrial partners involved in this issue. The projects are supported significantly by South Moravian region, which through SoMoPro program provided grants to six projects providing to the centre excellent foreign researchers (PS4CTX projects, REDEHAL, ED-MaleTox, Andromeda and Biogate Waterchem). In addition, the RECETOX implement projects for contract research supported by application sector, including international organizations like the United Nations Environment Program and the World Health Organization, government, regional authorities and industrial partners. In the years 2010-2016 RECETOX implemented more than 35 projects for international contract research on POPs, in which almost 70 countries were involved in (Central and Eastern Europe, Africa, Asia and the Pacific). These projects are carried out mostly as cooperation with UN organizations - UNEP, UNDP, UNIDO and WHO. At the national level almost 60 contract research projects were solved in the monitored period with partners in the Czech Republic. The biggest problem at the national level remains the sharing of data from monitoring and research projects.

3. STRATEGIES AND ACTION PLANS OF NIP

This second update of the National Implementation Plan as well as the previous version follows the basic objective of the Convention through five core strategic objectives outlined in the following chapter. These objectives also result from the current situation in dealing with POPs in the Czech Republic. More specific tasks are elaborated in individual action plans and sub-strategies (chapters 3.2. – 3.12.).

3.1. The implementation of the NIP and the main strategic objectives

The implementation of NIP in the CR is coordinated and evaluated continuously to an inter-ministerial Council of the National Centre for toxic compounds. Its statutes and rules of procedure are publicly available on the Internet.
The main strategic objectives designed to fulfil the objectives of the Convention in the Czech Republic:

- Elimination of entry of POPs to the environment and reduction of exposure to these substances
- Prioritization of solving old environmental burdens, improving public database
- Proper disposal of waste containing POPs, focusing on POPs in waste plastics
- Effective cooperation of ministries to address this issue
- Increasing awareness of newly listed POPs.

The following chapters these five fundamental objectives elaborate to specific activities. Events are divided into short-term, with an expected time frame for their fulfilment to 3 years and long-term - the performance of these tasks with regard to their nature requires a longer period of time (10 years) or need to be performed regularly. Given the number and content of activities varies depending on the assessment of the current situation, it is not possible to follow the numbering of individual activities, as it was used in previous versions. Planned activities in this version are numbered consecutively and if the current activity is related to the activities in the former version, it is stated in the note.

3.2. Action plan: Institutional and regulatory measures

3.2.1. Short-term activities (up to 3 years)

Number	Description	Note
3.2.1.1	Conduct regular reviews of the needs of registered acceptable purposes or specific exemptions. Ensure annual statistical estimate for the amount of POPs manufactured and put to market for these exemptions (the deadline for national reporting obligation). Responsibility: MoE Deadline: continuous activity according to the requirements of the Convention Cooperation: MIT	New activity
3.2.1.2	Evaluate the scope of entry of POPs into the soil through the sewage sludge and especially with regard to the possible setting limits on the content of POPs in the context of the significant risks to the environment and contamination of the food chain. Provide a report on implementation to the Council of the National Centre. Responsibility: MoE Deadline: VII/2019 Cooperation: MA	Modified activity 3.2.1.4. of the former NIP
3.2.1.3	Initiate adjustments of the waste water treatment method for those resulting from the industrial operations (for instance metallurgy or waste incinerators) with respect to the newly listed POPs. Provide a progress report to the the Council of the National Centre. Responsibility: MoE Deadline: XII/2019	Ongoing activity 3.2.1.5. of the former NIP
3.2.1.4	Evaluate and possibly update methodological materials after the completion of the first integrated permits and their changes under the amendment to Act No. 100/2001 Coll. Responsibility: MoE Deadline: X/ 2019	Modified activity 3.2.1.8. of the former NIP
3.2.1.5	Promote the inclusion of all substances listed in the Convention to IPR. Evaluate the possibility of adjustments of emission thresholds for	Modified activity 3.2.1.10. of the

	POPs in the IPR to the situation in the Czech Republic and to the need to obtain from the IPR more information on releases of POPs into the environment. Provide a report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity, first report X/2019 Cooperation: National Centre	former NIP
3.2.1.6	Submit reports on the results of checks related to the conformity of by-products and substances recovered from waste with the REACH legislation and the waste legislation in force, incl. information about the check of the low POPs content. Provide report to the Council of the National Centre. Responsibility: CEI Deadline: continuous activity, first report XII/2019 Cooperation: MoE, MIT	Ongoing activity 3.2.1.14. of the former NIP
3.2.1.7	Set criteria and operation procedures to manage waste resulting from incinerators and co – incinerators of wastes and hazardous waste generating POPs so that POPs releases into the environment are minimized. Provide report to the Council of the National Centre. Responsibility: MoE Period: VI/2019 Cooperation: MIT	Ongoing activity 3.2.1.15. of the former NIP

3.2.2. Long-term strategic objectives

Number	Description	Note
3.2.2.1	Delivery of control plans to the European Parliament and Council Regulation (EC) No. 765/2008 of 9 July 2008 setting out the requirements for accreditation and market surveillance relating to the marketing of products and repealing Regulation (EEC) No. 339/93. Responsibility: MIT Deadline: provide the control plan and assessment report by X/2019, then regular reports until III/ of the following calendar year Cooperation: MoE in cooperation with the Customs Administration, MH	New activity.
3.2.2.2	Develop a plan for financing activities (system solution) according to the requirements of the Convention on the basis of documents. Responsibility: MoE Deadline: continuous activity, first report X/2018 Cooperation: National Centre, MIT, MF, MA, MD, MoT, MH	Ongoing activity 3.2.2.2. of the former NIP
3.2.2.3	Present the results of checks of the implementation of the requirements of the EU Regulation No. 850/2004 and the Council Decision No. 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills. Responsibility: CEI Deadline: provide the control plan and assessment report by X/2019, then regular reports until III/ of the following calendar year	Ongoing and amended activity 3.2.2.4. of the former NIP
3.2.2.4	Based on the performance of 7th EAP support through available software tools the development and deployment of safe and sustainable POPs compensation including non-chemical solutions. Responsibility: MoE Deadline: provide the control plan and assessment report by X/2019, then regular reports until III/following calendar year Cooperation: MIT	New activity

3.3. Action plan: Production, export, import, use, stockpiles, landfills and waste of chemicals in Annex A, part I of the Stockholm Convention (pesticides)

3.3.1. Short-term activities (up to 3 years)

Number	Description	Note
-	-	-

3.3.2. Long-term strategic objectives

Number	Description	Note
3.3.2.1	Provide data on the occurrence of the pesticides in the environment with regard to the implementation of the international commitments of the Czech Republic. Implement the Czech POPs monitoring strategy in atmosphere including data management tools for evaluation and interpretation of generated data. Provide continuity of the implementation within budgets of involved ministries. Provide a report once a year to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity (report VI/calendar year) Cooperation: MA, MH	Ongoing activity 3.3.2.1. of the former NIP
3.3.2.2	Regularly inspect warehouses of agrochemicals through CISTA and CEI and continuously update the inventory of missing locations. Once a year provide the situation report on the results of inspections and plan for the next year to the Council of the National Centre. Responsibility: CEI Deadline: continuous activity on X day of the calendar year Cooperation: CISTA	Ongoing activity 3.3.2.3. of the former NIP
3.3.2.3	Ensure monitoring of old environmental burdens (sites) and follow impact/effect of their remediation including health and environmental risk assessment. Once a year provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity Cooperation: MA, MIT, MH	Ongoing activity 3.3.2.5. of the former NIP

3.4. Action plan: Production, import and export, use, identification, labelling, removal, storage and elimination of PCB and facilities containing PCB (Annex A, part II)

3.4.1. Short-term activities (up to 3 years)

Number	Description	Note
3.4.1.1	Assess the risks arising from open applications of PCB (from used coatings, sealants, releases from scrap processing) and propose measures. Responsibility: MoE Period: XII/2018	New activity
3.4.1.2	Design integrated management of waste with PCB that leads to recollection system ensuring safe storage until a safe method of PCB elimination using the existing collection systems. Once a year provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity	Ongoing activity 3.4.1.2. of the former NIP

3.4.2. Long-term strategic objectives

Number	Description	Note
3.4.2.1	Further support the establishment of a facility suitable for the environmentally sound disposal of POPs, of POPs containing waste, of contaminated devices and matrices based on available BAT/BEP principles. This device would be used even for the elimination/destruction of waste other than that containing POPs in the future. Once a year provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity Cooperation: MIT	Ongoing activity 3.4.2.1. of the former NIP
3.4.2.2	Present the results of the implementation of provisions of the Act on the Air protection concerning the combustion of waste oils	

	contaminated by POPs in small heating facilities (hot air heaters and boilers). Provide status report. Once a year provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity Cooperation: CEI	
3.4.2.3	Provide progress reports on the control of the PCB inventory nationally, update and add sites (contaminated sites, old environmental burdens) to the appropriate database. Responsibility: MoE, CEI Deadline: continuous activity, annual report Cooperation: all ministries	Ongoing activity 3.4.2.6. of the former NIP

3.5. Action plan: Production, export and import, use, stockpiles and wastes containing POPs – PFOS, PBDE, HCH, HBB, endosulfan and PeCB, HBCDD, PCP, PCN

3.5.1. Short-term activities (up to 3 years)

Number	**Description**	Note
3.5.1.1	In the case of new findings complement an inventory of resources, use (current and past), and the incidence of the already listed POPs and to implement/add the inventory of resources, production, use for the newly listed substances (HBCDD, PCN, PCP, HCBD). Forward the information to the Council of the National Centre in the form of a report. Responsibility: MoE Date: pilot data later XII/2018, then continuously Cooperation: all ministries	Modified activity 3.7N.1.1. of the former NIP
3.5.1.2.	Setting the basic rules for processors of waste electrical and electronic equipment and processors of car wrecks concerning disposal of waste plastics containing PBDE in the newly prepared draft of the Act on selected products with ended life (i.e. within the Order, which will contain basic requirements for the processing of electrical and electronic equipment, incl. the request to ensure that these plastics are not further recycled, respectively that the processors ensure that their customers would not continue to use these plastics to manufacture new products). Provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: XII/2018, updates every year until 2023, inclusive Cooperation: National Centre, MIT	Connecting activities 3.7N.1.2 . 3.7N.2.1. and 3.7N.2.3. of the former NIP and adapting to the current state
3.5.1.3.	Perform inventory of waste water treatment plants in relation of the POPs concentrations released, sort them by quality classes, set priority technologies and detoxification parameters. Collect and evaluate necessary investment requirements to amend technologies and search for co-financing where relevant. Responsibility: MoE Deadline: X/2019	Ongoing activity 3.5.1.6. of the former NIP
3.5.1.4	Discuss/inform the engaged places on the issue of recycling materials, which could include the PCN (similar to PCB) - neoprene/chloroprene, wood, paint treated products (bridges, ships, steel), the protective layer in cables Responsibility: MoE Deadline: X/2018 Cooperation: National Centre	New activity

3.5.2. Long-term strategic objectives

Number	Description	Note
3.5.2.1	In line with the waste management, work on the procedure for removing waste during demolition with regard to insulation systems. Focus on the possibility of separation which facilitates the recycling	New activity

	or energy recovery. Provide a report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity, the first report XII/2019 Cooperation: MH, MIT	
3.5.2.2.	Review the performance of waste management by POPs content limit laid down in Regulation (EC) No. 850/2004. Assess the possibilities of export, import with focus on plastic waste and the content of brominated flame retardants. Provide a report to the Council of the National Centre. Responsibility: CEI Deadline: continuous activity, the first report XII/2018 Cooperation: Customs Administration	New activity
3.5.2.3	Submit reports on the results of checks on goods, products, mixtures and substances placed on the market, in which the fulfilment of the limit POPs content will be checked according to applicable legislation. Among products, focus on products intended for children. Among compounds, focus on PFOS (textiles) and brominated flame retardants (recycled products). Provide a progress report to the Council of the National Centre. Responsibility: MoE, CEI Deadline: continuous activity, the first report X/2019 Cooperation: MIT, MH	Modified activity 3.7N.2.2. of the former NIP
3.5.2.4	Process inventory of POPs wastes. Responsibility: MoE Deadline: XII/2020 Cooperation: all ministries	New activity

3.6. Action plan: Releases of unintentionally produced chemicals (by-products of PCDD/F, HCB and PeCB)

3.6.1. Short-term activities (up to 3 years)

Number	Description	Note
3.6.1.1	To complete an inventory of PAH and PCDD/F in all components, and waste products. Together with the results of emission inventories (PAH, PCDD/F, PCB and HCB) take into account the results of this inventory in the processing of other strategic documents (SEP, POH, reference documents of best available techniques - BREF, etc.). Provide financial and project support for inclusion of new POPs, if appropriate. Responsibility: MoE Deadline: XII/2018 Cooperation: National Centre, CHMI	Ongoing, modified activity 3.6.1.1 and 3.6.1.2. of the former NIP
3.6.1.2	Inform the Council of the National Centre about the progress in the solution of unintentional production of HCB by a situation report. Information will be released publicly only after being considered by the Council after consultation and with the consent of the business entity. Responsibility: MoE Deadline: XII/2018 Cooperation: MIT	Ongoing activity 3.6.1.3. of the former NIP
3.6.1.3.	Assess the level of risk in the application of fly ash as a construction and reclamation materials. If necessary propose measures to reduce the risks. Responsibility: MoE Deadline: XII/2020 Cooperation: CEI, CENIA	New activity

3.6.2. Long-term strategic objectives

Number	Description	Note
3.6.2.1	As a follow up to the strategy reducing POPs emissions from	Ongoing activity

	incinerators in line with the implementation of the POPs Protocol (CLRTAP convention) control thoroughly the compliance with acceptable operation of facilities incinerating wastes and assess and implement monitoring of emissions of other POPs from Annex C and their content in wastes from incinerators. Provide a report including information on POPs levels to the Council of the National Centre once a year. Responsibility: CEI Deadline: continuous activity, XI month of the calendar year Cooperation: MoE	3.6.2.1. of the former NIP
3.6.2.2	Provide a thorough control of the whole life cycle of ashes from heat production, incinerators or pyrolysis facilities. CEI will provide a report to the Council of the National Centre once per year. Responsibility: CEI Deadline: continuous activity, ideally X month of the calendar year Cooperation: MoE, MIT	Ongoing activity 3.6.2.2. of the former NIP
3.6.2.3	Decrease POPs emissions (including those from new POPs) by increasing the natural gas use in households and reducing energy consumption, and improved waste management in line with the Integrated national programme to reduce emissions. Responsibility: MoE Deadline: continuously, the first situation report to XII/2018	Ongoing activity 3.6.2.3. of the former NIP
3.6.2.4	Measure POPs emission factors in mobile sources in order to render national emission inventory more precise (in particular non–road transport – army, agricultural, forestry, etc.). Provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity with reporting about the status to the Council as of December each year Cooperation: MD, MoT, MA	Ongoing activity 3.6.2.4. of the former NIP
3.6.2.5	Identify possible additional sources of POPs in Annex C; improve the identification of sources of POPs, which are subject to reporting to the IPR. Once a year provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity with reporting about the status to the Council as of December each year Cooperation: CHMI, FRS	Ongoing activity 3.6.2.5. of the former NIP and partly 3.6.2.7. of the former NIP
3.6.2.6	Evaluate possibilities of characterizing sites with ambient air burden of all POPs, including linking information – emissions – ambient air. Aim at preparation of national policy to reduce/limit emissions from all (including small) sources that share a significant proportion of total emissions. Use the information to update source part of the expert project data base GENASIS. Once a year provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity with reporting about the status to the Council as of December each year Cooperation: National Centre, MH	Ongoing activity 3.6.2.6. of the former NIP
3.6.2.7	Support the introduction of BAT/BEP including the assessment of their update with regard to reducing releases of new and existing POPs. Once a year provide a situation report to the Council of the National Centre. Responsibility: MIT Deadline: continuous activity with reporting about the status to the Council as of December each year Cooperation: MoE	Modified activity 3.6.2.7. of the former NIP
3.6.2.8	Continuously update emission inventory for sources such as crematoria, veterinary incineration facilities, incineration of hospital	Ongoing activity 3.6.2.8. of the

	waste, metallurgy, paper production technology etc. Responsibility: MoE Deadline: continuous activity, the first situation report to XII/2018 Cooperation: CHMI, National Centre	former NIP

3.7. Strategy: Identification of the significant stocks, commodities/products in use and wastes – Plan for the assessment and reduction of releases from the landfills and wastes of chemicals listed in Annexes A, B and C

3.7.1. Short-term activities (up to 3 years)

Number	Description	Note
-	-	-

3.7.2. Long-term strategic objectives

Number	Description	Note
3.7.2.1	Support the research and development projects on new technologies and biotechnologies focused on the continuous liquidation of POPs waste and of POPs contaminated matrices to minimize health and environmental risks. Provide a report on the situation and progress to the Council of the National Centre. Responsibility: MoE Deadline: XII/2018 Cooperation: MH, MIT	Ongoing activity 3.7.2.2. of the former NIP
3.7.2.2	Implement BAT/BEP when eliminating wastes with POPs including new POPs, should such BAT/BEP documents be available. In other cases strive to minimize releases of POPs to diminish potential impact on health and environment. Provide progress report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity, the first report to X/2018 Cooperation: MIT, CEI	Ongoing activity 3.7.2.4. of the former NIP

3.8. Action plan: Identification and appropriate management of contaminated sites

3.8.1. Short-term activities (up to 3 years)

Number	Description	Note
3.8.1.1	Provide written information on conclusions of the national inventory of environmental burdens programme including the proposal for the National plan and further activities and actions to the Council of the National Centre. The aim is to provide a framework solution of the issue including management of health and environmental risks. Responsibility: MoE Deadline: III/2018 Cooperation: MH	Ongoing activity 3.8.1.2. of the former NIP

3.8.2. Long-term strategic objectives

Number	Description	Note
3.8.2.1	Improve database of contaminated sites and ensure its regular updating incl. additional information on sites contaminated by newly listed POPs. Submit interim annual situation reports to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity, the first report to X/2018 Cooperation: MH	Ongoing (modified) activity 3.8.2.1 and 3.6.1.2. of the former NIP
3.8.2.2	Provide a continuous support to use on – site “in situ” methods to minimize potential risks of spreading pollutants from contaminated sites, as soon as particular hydrogeological or other characteristics allow. Provide information on performance and situation report each year.	Ongoing activity 3.8.2.2. of the former NIP

	Responsibility: MoE Deadline: continuous activity, the first report to X/2018	
3.8.2.3	Ensure continuous monitoring of contaminated sites and re-mediated sites. Provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity, situation report for the first time to X/2018 Cooperation: CEI	Ongoing activity 3.8.2.4. of the former NIP
3.8.2.4	Continue to support research evaluating contribution of POPs re-volatilization/re–evaporation from soils, landfills and water reservoirs to the total POPs emissions in the Czech Republic. Focus on following existing decontamination facilities regarding POPs re-volatilization from material prepared to decontamination/incineration. Responsibility: MoE Deadline: continuous activity	Activity 3.8.2.5. of the former NIP

3.9. Strategy ensuring the exchange of and accessibility/availability of information

3.9.1. Short-term activities (up to 3 years)

Number	Description	Note
3.9.1.1	Use electronic portals of the National Centre such as GENASIS, MONET and of the MoE to provide relevant and up-to-date information on POPs. Publish bulletin/newsletter of the National Centre and Yearbook (electronically). Provide situation report to the Council of the National Centre by XII/2018. Responsibility: MoE Deadline: June 2018 for the first time, then continuously, at least biannually Cooperation: National Centre, all ministries and other stakeholders	Activity 3.9.1.2. of the former NIP
3.9.1.2	Publish text of relevant BAT/BEP/BREF documents (on POPs) in Czech on the website of the National Centre. Once a year provide a situation report to the Council of the National Centre. Responsibility: National Centre Deadline: December 2018 for the first time, then ongoing, at least biannually	Ongoing activity 3.9.1.3. of the former NIP

3.9.2. Long-term strategic objectives

Number	Description	Note
3.9.2.1	Deepen national cooperation in the field of chemicals management and waste management taking into account process of strengthening cooperation and coordination between the three chemicals – waste MEAs (Basel, Rotterdam and Stockholm conventions, so-called synergies process) for all concerned stakeholders (including ministries). Provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity, situation report for the first time in X/2018	Reformulated activity 3.9.2.1. of the former NIP
3.9.2.2	Support involvement and participation of delegates/representatives of the Czech Republic in all relevant international forums dealing with chemicals and waste management. Provide information on participation of all activities to the Council of the National Centre. Responsibility: National Centre Deadline: continuous activity, by x day of the given calendar year Cooperation: all ministries	Ongoing activity 3.9.2.2. of the former NIP
3.9.2.3	Continue to ensure effective cooperation on POPs between the engaged ministries via Council of the National Centre and via particular activities of the National Centre such as – providing data on national inventory, cooperation on POPs monitoring and support	Reformulated activity 3.9.2.3. of the former NIP

	development of data information system to assess environment and potential health risks (GENASIS). Focus on timely completion of activities and functional information flow (both ways). Prepare a situation report. Responsibility: The Council of the National Centre Deadline: continuous activity, situation report for the first time in X/2018 Cooperation: National Centre, all ministries	
3.9.2.4	Provide a durable and sustainable funding to support functioning of the National Centre for toxic compounds. Responsibility: MoE Deadline: continuous activity, provide information into the yearly report on the current situation (submitted to the Council of the National Centre by June each year). Cooperation: all ministries	Ongoing activity 3.9.2.4. of the former NIP

3.10. Action plan: Public awareness, information and education

3.10.1. Short-term activities (up to 3 years)

Number	Description	Note
-	-	-

3.10.2. Long-term strategic objectives

Number	Description	Note
3.10.2.1	Continue to increase the public awareness and education concerning POPs and prevention of their generation (i.e. from local heating or burning) and link existing information. Make use of the activities by all ministries concerned, of the activities by the National Centre, of educational institutions at all levels, and of civil society's organisations. MEYS will focus its attention on supporting progress and development of education in providing new progressive ways of chemicals management, sustainable chemistry, life-cycle analysis, environmental impact assessment and risk assessment, etc. Information is to be provided to the National Centre that provides a summary report to the Council of the National Centre. The report is published at the National Centre website. Responsibility: MoE Deadline: continuous activity, first report X/2018 Cooperation: MEYS, MH and other ministries, universities, unions	Ongoing activity 3.10.2.1. of the former NIP
3.10.2.2	In preparation of educational/training campaigns (courses, summer schools) refer to the State Environmental Education and Public Awareness Programme in the Czech Republic in the education campaigns (EVVO). Provide information to the National Centre which prepares a summary report and submits it to the Council of the National Centre. Responsibility: MoE Deadline: continuous activity, first report X/2018 Cooperation: National Centre, MEYS, other ministries	Ongoing activity 3.10.2.2. of the former NIP
3.10.2.3	Ensure the public access to the information on POPs in an acceptable and comprehensible form. As a follow up to the Strategy for POPs Monitoring and development of the data repository for interpretation and visualization of data (GENASIS) provide support to keep developing the system at its educational – training modules. Provide a situation progress report to the Council of the National Centre each year. Responsibility: National Centre Deadline: continuous activity, first report X/2018 Cooperation: MoE, MH, MA	Ongoing activity 3.10.2.3. of the former NIP
3.10.2.4	Continue to perform awareness programmes nationally, regionally and locally. Regularly discuss targeted campaigns at the Council of the National Centre and provide information on campaigns to the National	Ongoing activity 3.10.2.4. of the

	Centre. Responsibility: MoE Deadline: continuous activity Cooperation: MEYS and other ministries	former NIP
3.10.2.5	Promote the POPs issue into the EU funding programmes and to the priority themes supported by grant agencies that support NGOs. Provide a situation report to the Council of the National Centre. Responsibility: MoE Deadline: every year Cooperation: SEF, MEYS, MIT	Ongoing activity 3.10.2.5. of the former NIP

3.11. Action plan: Monitoring POPs

3.11.1. Short-term activities (up to 3 years)

Number	Description	Note
3.11.1.1	Check sampling method for determining HBCDD in EPS, i.e. method for determination HBCDD in polystyrene for the limit value of 1000ppm with a view to reduction to 500 or 100 ppm. Responsibility: MIT Deadline: XII/2019 Cooperation: ACI	New activity
3.11.1.2	Summarize existing monitoring activities and propose, as appropriate, monitoring of the newly classified substances. Responsibility: National Centre Deadline: XII/2018 Cooperation: all ministries	New activity

3.11.2. Long-term strategic objectives

Number	Description	Note
3.11.2.1	Provide long-term and sustainable monitoring for all POPs listed in the Annexes to Stockholm Convention in two matrices - air and breast milk. When new POPs are listed in annexes to the Convention, take it into account in the monitoring and in the Concept for monitoring and possibly consider other matrices. The basis for long-term monitoring and its evaluation are: current monitoring at the monitoring station in Košetice, Optimized national monitoring network MONET_CZ for monitoring POPs in ambient air in the Czech Republic by passive sampling, long-term monitoring of breast milk and other forms of biomonitoring, integrated information system GENASIS Responsibility: MoE Deadline: pilot data on new POPs by end of 2018, otherwise provide a progress report to the Council of the National Centre through national inventory Cooperation: MH, CHMI, National Centre, MA	Ongoing activity 3.11.2.1. of the former NIP
3.11.2.2	Ensure uniform and a long-term sustainable reporting format and a continuous flow of information to the integrated information system GENASIS so that analysis of ecological and health risks and evaluation of time trends could be performed in a long term. Responsibility: MoE Deadline: continuous activity, each year or according to sampling campaigns Cooperation: MH, National Centre, MA, CHMI	Ongoing activity 3.11.2.3. of the former NIP

3.12. Action plan: Reporting

3.12.1. Long-term strategic objectives

Number	Description	Note
3.12.1.1	Ensure a timely submission of the CR report under the article 15 (reporting) of the Convention and 16 (effectiveness evaluation).	Ongoing activity

	Deadlines for each reporting cycle are always provided in decisions taken by the Conference of the Parties. Responsibility: MoE Term: According to the decisions of the Conference of the Parties Cooperation: National Centre, MH, MA, MIT	3.12.1.1. of the former NIP
3.12.1.2	Process the results of the POPs inventory and information on implementation of NIP goals/activities regularly (annually). Publish the summary reports in the Report on the Environment or MoE publications and on the websites of the MoE and of the National Centre. Responsibility: MoE Deadline: every year Cooperation: MH, MA, National Centre	Ongoing activity 3.12.1.2. of the former NIP
3.12.1.3	Prepare a regular yearly evaluation of the NIP implementation and submit it to the Council of the National Centre for consideration at least once per year. Responsibility: MoE Deadline: continuous activity, first report X/2018 Cooperation: all ministries	Ongoing activity 3.12.1.3. of the former NIP
3.12.1.4	Ensure a regular information flow to the public on the NIP implementation at least once per year. Responsibility: National Centre Deadline: continuous activity, first report XII/2018 Cooperation: all ministries	Ongoing activity 3.12.1.4. of the former NIP

4. PROPOSALS FOR FURTHER DEVELOPMENT, CAPACITY BUILDING AND PRIORITY

4.1. Priority of the updated NIP

Priorities are set according to the expected global development of the POPs management (period 2017-2025).

Long term priorities
Regarding the issue of chemicals and waste the long-term priorities of the updated Plan are considered to be the following activities:

- Continuous updating of the National POPs inventory from the perspective of newly listed POPs
- Disposal of still existing POPs and POPs wastes
- Improving the system of inventory of contaminated sites and determining their prioritization for remediation
- Support development of new technologies for disposal and remediation
- Support the development and deployment of safe and sustainable POPs compensation including non-chemical solutions
- Minimize exposure to POPs in all products, including imports and reduce indoor exposure to POPs, especially for children
- Ensure continuous organizational and financial monitoring of POPs following the global monitoring plan, the approved Concept of POPs monitoring in the Czech Republic and the newly listed pollutants
- Organizationally and financially to ensure the development and implementation of an expert system GENASIS
- Support base and applied research in particular risk assessment on new POPs types and their degradation products in the environment and biota – by grant agencies in the Czech Republic
- Consistently support the activities of the National and Regional Centre

Short term priorities and goals/activities
Considering the past activities and review of the implementation of the previous NIP, the current priority issues for the closest period in the Czech Republic are as follows:

- Support national information exchange on POPs, in particular for polybrominated and polyfluorinated chemicals, as ad hoc cases of contaminated products/wastes appear in the Czech Republic and their collection and elimination need to be undertaken urgently so that we do not add contamination to the waste flows and risks of exposure in the CR
- Further development of the GENASIS information system/data warehouse
- Resolving the complex issues associated with PCB
- Monitoring of compliance with Regulation (EC) No. 850/2004
- Monitoring of POPs in the Czech Republic, including new media - through the national monitoring network of the Czech Republic MONET - the analytical methods and data collection
- Prepare and adopt systemic solution for elimination of old environmental burdens
- Continue to share experience of the Czech Republic with other countries, in particular through Stockholm Convention Regional Centre – based on bilateral contacts with countries of the Central and Eastern Europe, Africa and based on strategic partnerships with other endorsed Stockholm Convention Regional Centres
- Provide long term funding for the implementation of the Stockholm Convention in the Czech Republic, effective use of existing sources and explore fully a possibility to use funds from Operational Programme for Environment

Responsibility: MoE
Deadline: evaluation 1x year at minimum, the Council will prepare a situation report by end of each calendar year, first one by XII/2018
Cooperation: all ministries, National Centre

4.2. Further development – research and development strategy

Proposals in this chapter would be continuously used/complemented and updated.
Focus POPs research on:

- New types of pollutants – brominated compounds – polybrominated diphenyl ethers, short chained chlorinated paraffins (SCCP), fluorinated items and others
- Polycyclic aromatic hydrocarbons (PAH) - aim at monitoring of further compounds from this group beyond the scope of PAH recommended by US EPA
- Volatilization of POPs carried out remediation and bioremediation

- Study emissions from burning biomass
- Study volatilization from contaminated sites, soils, landfills, buildings
- Study co-incineration of hazardous waste
- Development of procedures for monitoring POPs from mobile sources
- Support research and development projects, in particular focused on development of technologies to eliminate POPs from all environmental compartments; the project should be supported in particular by MIT and MoE
- Realize epidemiological studies relating data on the burden of population groups to potential health risks

Responsibility: MoE
Deadline: continuous activity
Cooperation: NIPH (epidemiological studies)

Significant research fields/activities/areas for near future that could be jointly implemented/supported by a range of institutions and also contribute to the broad and international implementation of activities related to POPs:

- Validation of transport and distribution models as well as for studies of atmospheric processes and deposition and re-volatilization flows, distribution of POPs between the gas phase and particulate matter for atmosphere and for water and particles in precipitations;
- Studying exchange processes in gas phase involving also POPs measurement in compartments such as water, plants and soils;
- Detailed, more sophisticated studies on exchange of air – surface for POPs; key aspect of this work is improvement in our expertise and use of techniques to study chiral compounds;
- Extensive studies for determining physical – chemical properties of POPs in a range of climatic conditions as a baseline to study exchange processes air – soil, air – water that are strongly depended on temperature;
- Global inventories, models of the global distribution;
- Study occurrence and forms, bioavailability and dynamics of POPs in soils, sediments and ground water;
- Study effects of POPs on humans and biota including molecular modelling of biodegradation mechanisms, biotransformation and toxicity;
- Study new pollutants (Polybrominated chemicals, chlorinated paraffins, toxaphene), superhydrofobic molecules, polar persistent compounds, products of abiotic and biotic degradations;
- Develop new analytical methods to follow new types of POPs, their metabolites, stereoisomers and more polar POPs;
- Propose and apply new efficient sampling procedures based on integral passive samplers;
- Study deposition and emission processes, transformation and bioavailability of POPs in terrestrial systems;
- Evaluate phytotoxic effects of POPs and their effects on soil microbial population and on soil fauna;
- Study effects of real environmental mixtures;
- Verify parameters, ecologic and health non-harmful effects and costs of biological decontamination of low – level contaminated soils as this information may have a great impact on minimising contamination

Responsibility: MoE
Deadline: continuous activity
Cooperation: GACR, AV, MH, MA RDC, TACR

5. TIMETABLE FOR THE UPDATED NIP IMPLEMENTATION

Distribute the National implementation plan to all interested institutions/stakeholders after it had been considered/approved by the Government – 1 month after their government approval.
Send the updated Plan (English version) to the Secretariat of the Stockholm Convention by 31.10. 2017.
Report on the implementation of the NIP by end of each calendar year to the Council of the National Centre for toxic compounds always at the end of the year – first report in 2018.
Evaluate and review updated NIP implementation plan by 31 September 2021. Submit information to the Government by this date.
Reach long term goals in the National implementation plan – within 10 years from the approval by the government.

6. CONCLUSION ON THE IMPLEMENTATION OF NIP

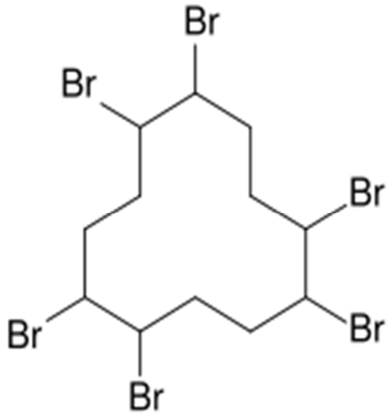
Short term activities in the former Plan were implemented in majority by now. Some activities were modified but left in short-term or transferred to long-term activities due to the fact that in terms of the complexity, these activities cannot be fulfilled over three years. Since 2009, the listed POPs moved from pesticides to predominantly industrial chemicals that are or have recently been used and the fulfilment of the objectives of the Convention in relation to them becomes time-consuming and technologically and financially demanding.
Inspection of activities in the past period was done at the Council of the National Centre for toxic compounds. But it is still necessary to intensify the transfer of information on NIP within ministries, which affects their performance and thus achieve more efficient cooperation. It would also be appropriate to strengthen the capacity of the supervisory bodies with regard to compliance with the provisions relating to POPs.

ANNEX: BASIC PROFILE OF POPS LISTED IN 2013, 2015

The source of information for the newly listed POPs were materials prepared in the framework of multilateral agreements in the field of environment (CLRTAP, Basel Convention, Rotterdam Convention, OSPAR), documents submitted to POPs Review Committee (POPRC, http://www.pops.int/documents/meetings/), the relevant legislation of the EU and the Czech Republic, including the Integrated Pollution Register (IPR) and the archives of the National Centre for toxic compounds. The Annex summarizes the basic profile of new substances.

HEXABROMOCYCLODODECANE (HBCDD)

Hexabromocyclododecane (HBCDD or incorrectly HBCD) is a non-aromatic cyclic alkane substituted with six bromine atoms (see figure).



In commercially produced mixtures occurs in three diastereomer: alpha, beta and gamma (alpha-HBCDD 134237-50-6, 134237-51-7 HBCDD beta, gamma-HBCDD 134237-52-8).

It was listed in Annex A (elimination) of the Stockholm Convention by the decision SC-6/13 adopted at COP6 in May 2013. That decision listed hexabromocyclododecane (No. CAS 25637-99-4) and 1,2,5,6,9,10- (No. CAS 3194-55-6) to eliminate the production and use, but allow exemptions. HBCDD is used as an additive flame retardant in combustion (flame retardant), it is not firmly bound in the matrix, it is dispersed throughout its entire volume without being chemically bonded or reacting with it. HBCDD is industrially produced by cyclododecane bromination or addition of bromine to the compound cis, trans, trans–1,5,9–cyclododekatrien, while in both cases there is a mixture of three diastereomers – alpha, beta and gamma.

The human organism receives HBCDD especially from dust and food. Many studies have demonstrated the potential of HBCD´ absorption into food (the main source is fish) in the digestive system and its subsequent distribution throughout the body, while the highest concentrations were found in the lipid tissues. However, there are no details about its effects on the human body. Animal testing demonstrated its negative effect on the development and hormonal balance in the exposed organism. Recent studies of adverse effects of HBCDD on reproduction of rats determined the value NOAEL3 10.2 mg/kg body weight/day.

HBCDD is not carcinogenic, mutagenic or toxic for reproduction and is not binding classified in Annex I to Directive 67/548/EEC. The substance meets the criteria for PBT according to Annex XIII to REACH.

As a substance which is not firmly bound in the matrix of the final product, HBCDD is released into the environment virtually over its entire life cycle. In the atmosphere as gas it rapidly degrades, bound to solid particles it is able to transport over long distances and subsequently falls back to the ground. It is non-degradable by sunlight. In soil HBCDD it is immobile; the half-microbial degradation is estimated at 210 days. In water it is firmly bound to solid particles sediments and it is not subject to hydrolysis. For aquatic organisms it is highly toxic. HBCDD is capable of significant bio-accumulation within the food chain.

For more detailed information on this substance in the Czech Republic see:

Kočí V., Hexabromcyclododecane and the environment, Chem. Listy 106, 1116□1121 (2012)

Pulkrabová J., Hajšlová J., Poustka J., Kazda R.: Fish and Biomonitors of polybrominated diphenyl ethers and Hexabromocyclododecane in Czech Aquatic Ecosystems: Pollution of the Elbe River Basin, Environmental Health Perspectives, 115, 2007, 28-34.

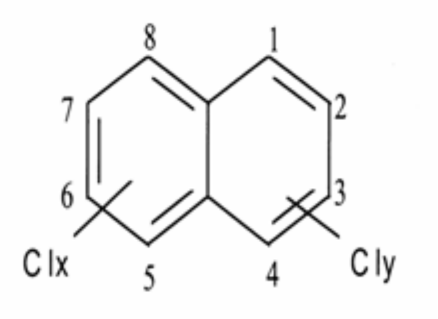
Hajšlová J., Pulkrabová J., Poustka J., Čajka T., Randák T.: Brominated Flame Retardants and Related Chlorinated persistent organic pollutants in Fish from River Elbe and its Main Tributary Vltava, Chemosphere, 69, 2007, 1195 – 1203.

Pulkrabová J., Hajšlová J., Vliv znečištění sedimentů a odpadních kalů z čistíren odpadních vod na ekotoxicitu a biodiverzitu daného ekosystému, Institute of Food Chemistry and Analysis, ICT Prague (http://www.vscht.cz/zkp/).

Pulkrabová J., Hrádková P., Hajšlová J., Poustka J., Nápravníková M., Poláček V.: Brominated Flame Retardants and Other Organochlorine Pollutants in Human Adipose Tissue Samples from the Czech Republic, Environment International 35, 2009, 63 – 68.

websites of Arnika - http://arnika.org/hbcd-hexabromcyklododekan

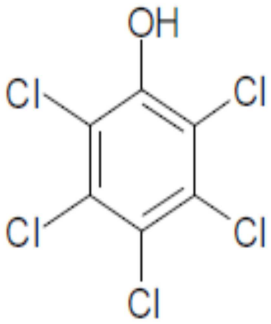
POLYCHLORINATED NAPHTHALENES (PCN)



PCN are a group of substances with theoretically possible 75 congeners. Their physical and chemical properties are similar to PCB. The PCN is characterized by high lipophilicity, chemical and thermal resistance. Are less flammable and have good electrical insulating properties and are soluble in organic solvents (benzene, petroleum ether, etc.).
PCN exhibit toxic effects similar to PCDD / PCDFs and coplanar PCB. They can cause chloracne, jaundice, cancer or even death. For more detailed information see the resources mentioned in the introduction of this Annex.

For more detailed information on this substance in the Czech Republic see:
Přibylová, P., Kukučka, P., Klánová, J., Holoubek, I. (2006), Polychlorinated naphthalenes and chlorinated paraffins in the air and soil samples from the Czech Republic. Organohalogen Compounds, 68, 37-41.
Thesis, RECETOX MU Brno, Mgr. Petr Kukučka - Properties, occurrence and determination of polychlorinated naphthalene in the environment
websites of Arnika - http://arnika.org/polychlorovane-naftaleny-pcns

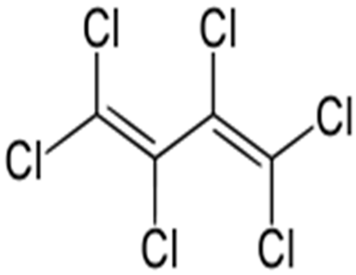
PENTACHLOROPHENOL (PCP)



Pentachlorophenol (PCP) is one of the most famous polychlorinated phenols. It was used primarily for protective coatings and wood preservatives. PCP is often contaminated with dioxins and furans (produced as an unwanted by – product of pentachlorophenol).
PCP leakage to the environment takes place during combustion of materials containing chlorine (e.g. PVC), the pyrolysis of polychlorinated biphenyls from the exhaust of cars. Pentachlorophenol arises also in the manufacture of chlorophenols, hexachlorobenzene and PCB and as a by – product of the bleaching of cellulose.
Its half-life in water is more than 194 days, in sediments 17-356 days and in soils 194-345 days. For more detailed information see the resources mentioned in the introduction of this Annex.

For more detailed information on this substance in the Czech Republic see:
Paserin, Vladimir. Preservation of the building material 1974, p. 319; Archive NIFC Strážnice, registry ÚHKD fund unprocessed, Chemika Bratislava, branch 04 Horné Orešany. Pentor 70. Information leaflet; Archive NIFC Strážnice, registry ÚHKD,
Šimůnková, Eva. Causes of damage to the timber (1989)
Komora, František. Protecting wood by Drevodekor impregnating agent. Bratislava: Alfa,1982,
websites of Arnika - http://arnika.org/pentachlorfenol-pecp
IPR register - https://www.irz.cz/node/83

HEXACHLOROBUTADIENE (HCBD)



Hexachlorobutadiene has a high bio-accumulation potential. It is a highly persistent compound, which has a very low mobility in the soil. It is very toxic for aquatic organisms and human health.
Commonly occurring concentrations of hexachlorobutadiene in water are about 0.003 µg/l. In the areas near the chemical plant where hexachlorobutadiene is manufactured or used, much higher concentrations ((0.022 to 43 µg/l) were measured. Very low concentrations (below 1 mg/l) were measured in some drinking waters.
Hexachlorobutadiene has toxic effects on the aquatic organism. It can also cause their death or damage of reproductive functions. Hexachlorobutadiene also causes slow growth of some plants. It has a large capacity to accumulate in the sediments and water. Hexachlorobutadiene has a high potential for bio-accumulation in fish and shellfish, so it accumulates

throughout the food chain and its influence may become more important on a global scale. Hexachlorobutadiene concentrations in fish were measured between 0.1 and 4.7 mg/kg.
Hexachlorobutadiene is dangerous to human health. It can be inhaled, ingested, but also permeates the skin. The person may be exposed to the following threats: extreme increase the likelihood of cancer, respiratory irritation, liver and kidney damage or damage of the thyroid gland. High or repeated exposure can damage the central nervous system and cause irritability, muscle weakness, tremors, seizures, or a feeling of "pins and needles" in the skin. Repeated exposure may cause irreversible damage of the skin, such as a change of pigmentation and thickness. Hexachlorobutadiene chronic exposure may cause cancer or damage the healthy development of the fetus.

For more detailed information on this substance in the Czech Republic see:
Max, M., et al. 2002: Hazardous substances in wastewater from chemical industry Czech Republic (Industrial situational studies). TECHEM, Prague, December, 2002.
Rieder, M. et al. 2003: The presence and movement of hazardous substances in the hydrosphere of the Czech Republic. Final Report of the RD Project/650/3/00. Czech Hydrometeorological Institute Prague, February 2003.
MINISTRY OF THE ENVIRONMENT OF THE CZECH REPUBLIC 2004: Hexachlorobutadiene. Programs for relevant hazardous substances. Prague 2004.
websites of Arnika - http://arnika.org/hexachlorbutadien-hcbd
IPR register - https://www.irz.cz/node/49