

CZECH REPUBLIC
UPDATED NATIONAL IMPLEMENTATION PLAN
FOR THE STOCKHOLM CONVENTION
ON PERSISTENT ORGANIC POLLUTANTS
in the period 2012 – 2017

This National Implementation Plan has been adopted by the Government of the Czech Republic on 8th November 2012 by the Government Order No 810/2012 Coll.

This document is a courtesy translation of the Plan into English for the purposes of its submission to the Conference of the Parties to the Stockholm Convention on persistent organic pollutants

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GLOSSARY AND ACRONYMS

ABS	acrylonitrile – butadiene – styrene
ACP	Arctic Contamination Potential
ACR	Army of the Czech Republic
IADN	Integrated Atmospheric Deposition Network
AIP	Agency for Integrated Prevention
BAF	Bioaccumulation Factor
BAT	Best Available Technology/Techniques
BCD	Base Catalysed Decomposition
BCF	Bioconcentration factor
BDE, BDEs	Brominated diphenylether, brominated diphenylethers
BEP	Best Available Practice
BFRs	Brominated flame retardands
BMF	Biomagnification factor
BREF	EU reference documents on BAT: BAT Reference Documents
c –	commercial
CAS	Chemical Abstracts Service
CCD	Charge – Coupled Device
CEE	Central and Eastern Europe (Central and Eastern European Countries)
CEI	Czech Environmental Inspectorate
CENIA	Czech Environmental Information Agency
CGS	Czech Geological Survey
CHMI	Czech Hydrometeorological Institute
CISTA	Central Institute for Supervising and Testing in Agriculture
CLRTAP	Convention on long – range transboundary air pollution
COPERT	COmputer Programme to calculate Emissions from Road Transport
Council	Council of the National Centre for persistent organic pollutants
CPs	Chlorinated paraffins
CSIA	Contaminant – specific isotope analyse
CTIA	Czech Trade Inspection Authority
DDE	Dichlorodiphenyldichloroethylene
DDT	1,1,1 – trichlor – 2,2 – bis(4 – chlorophenyl)ethane
DEs	Diphenyl ethers
EC	European Communities
ECHA	European Chemicals Agency
EEA	European Environment Agency
EEC	European Economic Community
EINECS	European Inventory of Existing Commercial Chemical Substances Information
Eionet	Environmental Observation Network
ELV	End of Life Vehicles
EMEP	European Monitoring and Evaluation Program
EPA	Environmental Protection Agency
EPOC	Environment Policy Committee
ETFE	Ethylene tetrafluoroethylene
EU	European Union
FYROM	Former Yugoslavian Republic Of Macedonia
GACR	Grant Agency of the Czech Republic



GENASIS	Global Environmental Assessment and Information System
GIS	Geographic information system
HBB	Hexabromobiphenyl
HBCDD, HBCD	Hexabromocyclododecane
HCB	Hexachlorobenzene
HCBD	Hexachlorobutadiene
HCH	Hexachlorocyclohexane
γ-HCH	Lindane, gamma HCH
IARC	International Agency for Research on Cancer
ICT Praha	Institute of Chemical Technology, Prague
IPEN	International POPs Elimination Network (international network of the non – governmental organizations cooperating in the enforcement of the Stockholm Convention on POPs)
IPPC	Integrated Prevention and Pollution Control
IPR	Integrated Pollution Register (PRTR, pollution release and transfer register)
ISOH	Integrated system on implementation of waste management (Informační Systém Odpadového Hospodářství)
ISPOP	Integrated system of reporting obligations, Integrovaný Systém Plnění Ohlašovacích Povinností
ISSaR	Information System Statistics and Reporting Environment
IUCLID	International Uniform Chemical Information Database
IUPAC	International Union of Pure and Applied Chemistry
IZS	Integrated Rescue System, Integrovaný Záchraný Systém
JISŽP	Single environmental information system of the Czech Republic, Jednotný Informační Systém Životního Prostředí
LCD	Liquid crystal display
Log K _{ow}	Partition coefficient oktanol – water
MA	Ministry of Agriculture
MD	Ministry of Defence
MEAs	Multilateral Environment Agreements
MEYS	Ministry of Education, Youth and Sports
MF	Ministry of Finance
MH	Ministry of Health
MIT	Ministry of Industry and Trade
MLV	Maximum Limit Value
MoE	Ministry of Environment
MONARPOP	Monitoring Network in the Alpine Region for Persistent and other Organic Pollutants
MONET_CZ	Monitoring network of ambient air in the Czech Republic; by passive sampling
MT	Ministry of Transport
MU Brno	Masaryk University Brno
National Centre	National Centre for persistent organic pollutants
NAZV	National Agency for Research in Agriculture, Národní Agentura pro Zemědělský Výzkum
NCA CR	Nature Conservation Agency of the Czech Republic
NGOs	Non – governmental organization
NIKM	National inventory of contaminated sites, Národní Inventarizace Kontaminovaných Míst
NIP	National Implementation Plan for the Stockholm Convention on POPs
NIPH	National Institute of Public Health

NOEC	No Observed Effect Concentration
NOEL	No Observed Effect Level
OCPs	Organochlorinated pesticides
OECD	Organisation for Economic Co – operation and Development
OSB	Oriented Strand Board
OSMT	Czech Office for Standards, Metrology and Testing
OSPAR	Convention for the Protection of the Marine Environment of the North – East Atlantic
PAHs	Polyaromatic hydrocarbons
PBBs	Polybrominated biphenyls
PBDEs	Polybrominated diphenyl ethers
PCBs	Polychlorinated diphenyl ethers
PCDDs/Fs	Polychlorinated dibenzo – p – dioxins and dibenzofurans
PCNs	Polychlorinated naphthalenes
PCTs	Polychlorinated terphenyls
PeCB	Pentachlorobenzene
PFAS	Perfluoroalkyl substances
PFBA	Perfluorobutanoic acid
PFCA	Perfluorinated carboxylic acid
PFOA	Perfluorooctanoic acid
PFOS, PFOS–F	Perfluorooctane sulfonic acid (PFOA/PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS – F)
PFHpA	Perfluoroheptanoate
PFHxA	Perfluorohexanoic acid
PFPA	Pentafluoropropionic anhydride
Plan	National Implementation Plan for the Stockholm Convention on POPs
POPRC	POPs Review Committee
POPs	Persistent organic pollutants
PUF	Polyurethane Foam
REACH	Registration, Evaluation, Authorisation and Restriction of Chemicals, regulation of the European Parliament and Council No 1907/2006 as amended
RECETOX	Research Centre for Toxic Compounds in the Environment
RoHS	The Restriction of Hazardous Substances Directive 2002/95/EC, Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment
SC	Stockholm Convention on persistent organic pollutants
SCCPs	Short chain chlorinated paraffins
SEKM	Inventory system for contaminated sites, Systém evidence kontaminovaných míst
SESEZ	Inventory system for old environmental burdens in the Czech Republic, Systém evidence starých zátěží životního prostředí
SEF CR	State Environmental Fund of the Czech Republic
SEP CR	State Environmental Policy of the Czech Republic
SPA	State Phytosanitary Administration
TDI	Tolerable daily intake
TEQ	Toxic equivalent
TFS	Transfrontier Shipment of Waste
T.G.M. WMRI	T. G. Masaryk Water Management Research Institute
TOCOEN	Toxic Organic COmpounds in the ENvironment
UN	United Nations

UN ECE	UN European Economic Commission
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
US	United States of America (USA)
US EPA	U.S. Environmental Protection Agency
US-TRI	U.S. Toxics Release Inventory database
VaV	Research and Development, Výzkum a Vývoj
WEEE	Directive 2012/19/EU of the European Parliament and of the Council of 4 July 2012 on Waste Electrical and Electronic Equipment
WHO	World Health Organisation

1. INTRODUCTION

1.1 Update of the National Implementation Plan (NIP) for the Stockholm Convention

The Czech Republic became Party (thereafter a Party) to the Stockholm Convention on persistent organic pollutants (thereafter the Convention or Stockholm Convention or SC) on the 17th of May 2004 (published in the Czech collection of international agreements No 40/2006 Coll.) and development of the National implementation plan for the Stockholm Convention (thereafter referred to as “Plan” or “NIP”) is one of its obligations pursuant to the article 7 of the Convention. The original Plan was submitted to the Conference of the Parties within two years from entry into force for the Czech Republic on the 8th of May 2006. The Government of the Czech Republic adopted the Plan on the 7th of December 2005 by its Government Order No 1572/2005 Coll. The original Plan defines the following seven strategic objectives of the POPs management: elimination of POPs releases into the environment, remediation of old environmental burdens, establishment of installations to collect wastes containing POPs, introduction and application of BAT/BEP, preparation of complex plans for waste elimination, provision of information on areas/regions contaminated by POPs and optimization of monitoring programmes.

The former Plan established strategic objectives and action plans for POPs for the period 2006 – 2011, including a way forward to 2015. The report on the implementation of the Plan was presented to the Czech Government which took note of the report by its Government Order No 1307/2009 of 19th of October 2009 and requested preparation of the updated NIP by the 30th of September 2012.

Update of the Plan is a duty of a Party pursuant to the Article 7 of the Stockholm Convention. The update has to occur within 2 years from entry into force of amendments to Annexes of the Convention. The timetable for the NIP update was prepared immediately after the 4th Conference of the Parties (3 – 8 May 2009) and notification by the Depositary on inclusion of 9 new POP substances into Annexes A, B and C of the Convention on 26 August 2009. Following to the outcomes of the 5th meeting of the Conference of the Parties to the Stockholm Convention in 2011 and the inclusion of endosulfan in the Annex A, the Czech Republic decided to include this chemical as well into that NIP update, namely to rationalization of cost.

Interministerial group – Council of the National Centre for persistent organic pollutants (hereafter “Council”) supported by the National Centre for persistent organic pollutants (hereafter “National Centre”) were entrusted to prepare updated Plan. The Council has negotiated proposals for new action plans at a minimum twice per year during 2010 – 2011. The proposals were discussed and commented by all interested stakeholders including non – governmental organizations. Text of the action plans was finalized in June 2012 and discussed with all ministries in the interministerial consultations and was submitted to the Czech Government for adoption.

Form and content of the updated Plan derives from the outputs of the 4th and 5th meeting of the Conference of the Parties to the Stockholm Convention on POPs, outcomes of the meetings of the POPs Review Committee (POPRC) and needs of the Czech Republic. At places, update or reformulation and clarification of the former activities took place due to more recent EU strategic documents or law in force, national strategies and policies on chemicals management, contaminated sites and wastes as well as on newly identified sites based on Council meetings or comments put forward by ministries.

The plan also contains available information on candidate chemicals that may potentially be listed between 2013 – 2017 into Annexes of the Stockholm Convention (hexabromocyclododecane, hexachlorobutadiene, polychlorinated naphthalenes, pentachlorophenol, short chain chlorinated paraffins (SCCPs)).

The following guidance and guidelines prepared by the Stockholm Convention secretariat in cooperation with experts were used in preparation of the Plan: Guidance on preparation of NIPs (version 2005), Guidelines on review and update of NIPs (annex to decision SC – 1/12, annex to decision 2/7) and in particular Practical guide to review and update NIP (version 2011).

We found that the structure of our former Plan does not fully correspond to currently recommended structure in the annex V of the Guidelines to prepare NIPs (UNEP/POPS/COP.2/INF/7), as the former Plan of the Czech Republic was prepared in 2005 (2006, EN version) and therefore prior finalization of the first guidelines based on the SC – 2/7. Current structure of the updated Plan builds on the former structure, in particular for easier orientation in the activities of the action plans. Some of these activities need to be carried over. Fulfilled activities were removed; codes of the uncompleted former activities were not changed to allow for continuity and orientation in the text. New relevant action plans were added to mirror listing of new POPs as described in detail in the introduction to the chapter 3.

1.2 The Stockholm Convention

The Stockholm Convention on persistent organic pollutants is a global environmental agreement, has the objective of protecting human health and the environment from persistent organic pollutants (POPs). POPs are toxic compound able to remain in the environment for a long period of time, being transported over long distances and accumulate in the living organisms. The agreement (Convention) has been adopted in May 2001 and entered into force on 17th May 2004. The Stockholm Convention had 177 Parties, including the Czech Republic, by the 30th of June 2012. The full text of the Convention and its annexes is available on the Stockholm Convention website (www.pops.int). Treaties and the amendments adopted were published as 90/2010 Coll. int. Treaties.

Persistent organic pollutants (POPs) are manmade chemicals. They are organic compounds and their unsound use contaminates environment. Nevertheless, POPs have a number of useful properties such as plant protection formulas for use in agriculture or in construction (flame retardants), on the other hand, they are highly toxic, and some of them are carcinogenous, mutagenous or teratogenous.

POPs are dangerous due to their persistence in the environment and for some compounds a natural decomposition (by sun, water, biota and other natural events) was not yet detected. POPs can bioaccumulate in living organisms, if they penetrate into them. Many of them are difficult to metabolise by organism, so that increases their negative effects. POPs can be transported over long distances by air or water, but also by products, wastes and biota. Many POPs therefore exist or cause effects also in those environments where they have never been used.

Originally, Stockholm Convention regulated production (intentional and unintentional), use, import, and export of twelve POPs featured in Annexes A, B and C: aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), mirex, toxaphene, polychlorinated biphenyls (PCBs), dichlorodiphenyltrichloroethane (DDT) and polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs). Listed POPs are anthropogenic chemicals used as pesticides, industrial chemicals as well as chemicals being unintentionally produced (by combustion for example).

The 4th meeting of the Conference of the Parties held in Geneva on 4 – 8 May 2009 has adopted decisions to list additional 9 substances. Annex A (elimination from use and production) added alpha hexachlorocyclohexane, beta hexachlorocyclohexane, chlordecone, hexabromobiphenyl, hexabromodiphenyl ether and heptabromodiphenyl ether, lindane, pentachlorobenzene, tetrabromodiphenyl ether and pentabromodiphenyl ether. Annex B was broadened by perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride (also referred to as PFOS based compounds) and Annex C was broadened by pentachlorobenzene. Those amendments entered into force for the Czech Republic at the same date as for most Parties, on the 26th of August 2010.

Upon newly listed chemicals – polybrominated and PFOS – the Parties may continue using certain chemicals or continue their production in the scope of specific exemptions or acceptable purposes as stated in relevant decisions, in case that this Party registers the exemption or notifies the acceptable purpose to the Secretariat of the Stockholm Convention. Specific exemptions are valid for 5 years (until 26 August 2015); acceptable purposes are not time limited so strictly. Further details are in chapter 2.3.8.

The 5th meeting of the Conference of the Parties has added technical endosulfan and its isomers into Annex A and it is possible to register specific exemption for its use. Amendment of the Annex A will enter into force on the 27th of October 2012. This will double the amount of POPs listed in the Stockholm Convention within 10 years of its signature. List of chemicals in the Annexes is in Table 1. Information on compounds included into convention in 2009 and 2011 are provided in Annex 1.

The POP Review Committee considers at present the following candidate substances to be included in the Annexes of the Stockholm Convention: short chain chlorinated paraffins (so called SCCPs), pentachlorophenol, hexachlorobutadiene, polychlorinated naphthalenes and hexabromocyclododecane (HBCDD, HBCD). Those considerations would be finalized for HBCDD at the 6th meeting of the Conference of the Parties in 2013; other substances would likely be considered for adoption at COP7 in 2015, respectively. Nevertheless, some long term activities on those candidate substances are already included in this Plan as well as profiles of the substances are provided in Annex 1 (A1.12).

The Convention objective is to improve environment and health protection and it therefore controls, in line with the precautionary principle, the production (intentional and unintentional), use, export and import of POPs listed in its Annexes. At the same time, it contains a detailed procedure and criteria for cases of listing additional compounds into annexes. Furthermore, it lays down measures to reduce POPs emissions, prevention of releases of chemicals having POPs properties into environment by implementing BAT/BEP measures and environmentally sound waste management of waste containing POPs.

Table 1 Chemicals listed in Annexes of the Stockholm Convention as of May 2012

Annex of the Stockholm Convention	Annex A – elimination	Annex B – reduction	Annex C – unintentional production
Date of listing into Annexes: from entry into force (total of 12 POPs)	aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), mirex, toxaphene, polychlorinated biphenyls (PCB)	1,1,1 – trichloro – 2,2 – bis (4 – chlorophenyl) ethane (DDT)	hexachlorobenzene (HCB), polychlorinated biphenyls (PCBs) and polychlorinated dibenzo p – dioxins and dibenzofurans (PCDDs/PCDFs).
Date of listing into Annexes: 2009 (total of 21 POPs)	α – hexachlorocyclohexane, β – hexachlorocyclohexane, chlordecone, hexabromobiphenyl, hexabromodiphenyl ether and heptabromodiphenyl ether, lindane, pentachlorobenzene, tetrabromodiphenyl ether and pentabromodiphenyl ether	Perfluorooctane sulfonic acid (PFOS), its salts and perfluorooctane sulfonyl fluoride (PFOS – F)	pentachlorobenzene
Date of listing into Annexes: 2011 (total of 22 POPs)	endosulfan		

Technical assistance and financial mechanism is available to support implementation of the Convention in developing countries. The Convention also requires regular reporting on production and use of POPs as well as on their levels in core matrices in the environment (air and breast milk); preparation of the national plan to control POPs (national implementation plan) and regular evaluation of the effectiveness of Convention's measures is also set by the Convention.

Cooperation and coordination with other two conventions on chemicals and wastes has been explored and strengthened since 2008. Synergies are thereby increased.

Stockholm Convention requires that parties eliminate production and use or reduce their use of selected chemicals listed in Annexes A or B. In contrast to the Protocol on persistent organic pollutants that is protocol to the UN ECE Convention on the long range transboundary air pollution (CLRTAP) valid in the European region, the Stockholm Convention is global and contains also defined goals in developing countries, though acceptable purposes, specific exemptions or conditions to production and use are available, as further described in Table 2.

Table 2 Stockholm Convention, use of compounds and specific exemptions or acceptable purposes

Substance/mixture	Activity	Specific Exemption
aldrin CAS: 309 – 00 – 2	production	none
	use	none
chlordane CAS: 57 – 74 – 9	production	none (exemption and relevant list expired in 2009)
	use	none (Exemption below expired in 2009: Local ectoparasiticide Insecticide Termiticide Termiticide in construction and dams Termiticides in roads Additives in plywood adhesives)
dieldrin CAS: 60 – 57 – 1	production	none
	use	none (former exemption – In agricultural facilities – expired in 2009)
endrin CAS: 72 – 20 – 8	production	none
	use	none
heptachlor CAS: 76 – 44 – 8	production	none
	use	none (exemption below expired in 2009 Termiticide Termiticide in house construction Termiticide (underground) Adjustment, processing of wood for use in underground cable vaults)

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hexachlorobenzene CAS: 118 – 74 – 1	production	none (exemption expired in 2009)
	use	Intermediate product Solvent in pesticides In temporarily closed space – limited system
mirex CAS: 2385 – 85 – 5	production	none (exemption expired in 2009)
	use	Termiticide
toxaphene CAS : 8001 – 35 – 2	production	none
	use	none
PCBs polychlorinated biphenyls CAS: many congeners	production	none
	use	Products used in line with measures of Annex A part II; details para (b) + see text below this table
DDT 1,1,1 – trichloro – 2,2 – bis (4 – chlorfenyl) ethane CAS: 50 – 29 – 3	production	Acceptable purpose: Disease vector control use in accordance with part II of this Annex Specific exemption: Intermediate in production of dicofol Intermediate
	use	Acceptable purpose: Disease vector control use in accordance with part II of this Annex Specific exemption: Intermediate in production of dicofol Intermediate
alpha hexachlorocyclohexane CAS: Racemic: 319 – 84 – 6, (+) alpha HCH: 11991169 – 2, (–) alpha HCH: 119911 – 70 – 5	production	none
	use	none
beta hexachlorocyclohexane CAS: 319 – 85 – 7	production	none
	use	none
chlordecone CAS: 143 – 50 – 0	production	none
	use	none
hexabromobiphenyl CAS: 36355 – 01 – 8 (Common CAS number for HBB isomers)	production	none
	use	none
hexabromodiphenyl heptabromodiphenyl ether CAS: many congeners	production	none
	use	Articles in accordance with provisions of part IV of this Annex. A Party may allow recycling of articles that contain or may contain hexabromodiphenyl ether and heptabromodiphenyl ether, and the use and final disposal of articles manufactured from recycled materials that contain or may contain hexabromodiphenyl ether and heptabromodiphenyl ether, provided that: The recycling and final disposal is carried out in an environmentally sound manner and does not lead to recovery of hexabromodiphenyl ether and heptabromodiphenyl ether for the purpose of their reuse.
lindane CAS: 58 – 89 – 9	production	none
	use	Human health pharmaceutical for control of head lice and scabies as second line treatment
tetrabromodiphenyl ether and pentabromodiphenyl ether CAS: many congeners	production	none
	use	Articles in accordance with the provisions of Part IV of this Annex A. Party may allow recycling of articles that contain or may contain tetrabromodiphenyl ether and pentabromodiphenyl ether, and the use and final disposal of articles manufactured from recycled materials that contain or may contain tetrabromodiphenyl ether and pentabromodiphenyl ether, provided that: The recycling and final disposal is carried out in an environmentally sound manner and does not lead to recovery of tetrabromodiphenyl ether and pentabromodiphenyl ether for the purpose of their reuse.
pentachlorobenzene CAS: 608 – 93 – 7	production	none
	use	none

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

For polychlorinated biphenyls (Annex A: Elimination – part II) each Party shall:

- 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 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.

Annex B (Restriction/Reduction) lays down for DDT (1,1,1 – trichloro – 2,2 – bis(4 – chlorfenyl)ethan

- 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.

Annex C (Unintentional production) contains the following chemicals:

Polychlorinated dibenzo – p – dioxins and dibenzofurans (PCDDs/PCDFs)

Hexachlorobenzene (HCB) (CAS: 118 – 74 – 1)

Polychlorinated biphenyls (PCBs),

which are formed and released unintentionally from anthropogenic sources whose categories are listed below:

Source categories (part II)

Table 3 Overview of POPs – production, use and unintentional production in the Czech Republic – as of 30 June 2012

Substance	CAS number	Current overview – production, use and unintentional production
Aldrin	309-00-20	Not produced or used, banned in 1980.
1,1,1-trichloro-2,2 – bis(4-chlorfenyl) ethan (DDT) and its metabolites	50-29-3	Banned for use as a pesticide in the former Czechoslovakia in 1974, however DDT was used in limited quantities in selected products, for example for head lice liquidation in Neratidine, Neracaine and Pentalidol products even after this year; it was phased out between 1978 – 1983.
Dieldrin	60-57-1	Never registered.
Endrin	72-20-8	Not produced or used, banned from 1984.
Heptachlor	76-44-8	Not produced in the Czech Republic, use in agriculture banned in 1989.
Hexachlorobenzene, HCB	118-74-1	HCB is not intentionally produced in the Czech Republic; its production in Spolana Neratovice was terminated in 1968; use as a pesticide was banned in 1977. HCB is inevitable but unintentional by – product in the production of chlorinated hydrocarbons such as perchloroethylen (produced in Spolek pro chemickou a hutní výrobu, Ústí nad Labem). HCB is also generated in the chlorine production by electrolysis (together with octachlorostyrene).
Chlordane	12789-03-6	Never produced nor used in the Czech Republic, never registered.
Lindane/ Hexachlorocyclohexane	58-89-9	γ – HCH was used in combination with DDT (products Lydikol and Gamadyn) in the former Czechoslovakia; after DDT ban (1974), lindane continued to be used for seed treatment; its use in agriculture is currently not allowed.
Mirex	2385-5	Never produced or used in the Czech Republic; never registered.
Toxaphene	8001-35-2	Not produced in the Czech Republic; its use was banned in 1986. A large quantity of products containing toxaphen (Melipax) was imported into the former Czechoslovakia between 1963 and 1987.
Polychlorinated biphenyls, PCB		Produced in the former Czechoslovakia among 1959 – 1984.
Polychlorinated dibenzo – p – dioxins and dibenzofurans, PCDD/PCDF		Unintentional production only – by combustion processes.
Perfluorooctane sulfonic acid (PFOS) and its salts	1763-23-1	Such compounds have never been produced in the Czech Republic. No information is available on their import, occurrence and consumption.
Commercial octabromodiphenyl ether, hexabromodiphenyl ether and heptabromodiphenyl ether	32536-52-0	Such chemicals have not been produced in the Czech Republic. No information is available on their import and use.
Tetrabromodiphenyl ether and pentabromodiphenyl ether	5436-43-1 60348-60-9	Such chemicals have never been produced in the Czech Republic. No information is available on their import and use.
Chlordecone	143-50-0	Chlordecone has never been used nor registered as pesticide in the Czech Republic. Its occurrence in the surface waters, silts and sediments was under the level of detection.
Hexabromobiphenyl	6355-01-8	Hexabromobiphenyl has never been used nor registered as pesticide in the Czech Republic. At present no data are available on its levels in the environment.
Pentachlorobenzene	608 – 93 – 5	This compound is not produced intentionally. We suppose it has been used, but no detailed information is available. It is generated as inevitable but unintentional by – product when producing chlorinated hydrocarbons. Data available in the Integrated Pollution, Release and Transfer Register of the Czech Republic show its transfer in waste (D), based on calculation in quantities 7070 – 26881.6 kg/year between 2004 – 2010. Pentachlorobenzene has been detected in river ecosystems of the Czech Republic.
Technical endosulfan and its salts	115 – 29 – 7	Its registration as plant protection agent has expired. It had been used as insecticide and to protect wood. It may occur due to former contamination (historical – including obsolete stocks and contaminate pesticide storage). Based on available information no production and import occurs in the Czech Republic.

The following industrial source categories have the potential for comparatively high formation and release of above mentioned chemicals to the environment:

- Waste incinerators, including co – incinerators of municipal, hazardous or medical waste or of sewage sludge
- Cement kilns firing hazardous waste
- Pulp and paper production using chlorine or chemicals generating elemental chlorine for bleaching
- Thermal processes in the metallurgical industry:

- Secondary copper production
- Sinter plants in the iron and steel industry
- Secondary aluminium production
- Secondary zinc production.

Polychlorinated dibenzo – p – dioxins and dibenzofurans, hexachlorobenzene and polychlorinated biphenyls may also be unintentionally formed and released from the following source categories, including:

- Open burning of waste, including burning of landfill sites;
- Thermal processes in the metallurgical industry not mentioned in Part II;
- Residential combustion sources;
- Fossil fuel – fired utility and industrial boilers;
- Installations burning wood and other biomass fuels;
- Specific chemical production processes releasing unintentionally formed persistent organic pollutants, especially production of chlorophenols and chloranil;
- Crematoria;
- Motor vehicles, particularly those burning leaded gasoline;
- Destruction of animal carcasses;
- Textile and leather dyeing (by chloranil) and finishing (with alkaline extraction);
- Shredder plants for the treatment of end of life vehicles;
- Smouldering of copper cables;
- Waste oil refineries.

The Czech Republic has historical experience on the large POPs 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; changes in 1990 brought further restriction of POPs releases into the environment, in particular from industrial sources. Strict limits in the legislation and measures to eliminate certain chemicals allowed stopping or reducing releases. Non – industrial sources also reduce their POPs releases, but significantly less fast. Remediation of old environmental burdens and contaminated sites has started after 1990, with a design and operation of large and very costly measures. Table 3 contains an overview on use and production of POPs that are listed in the Convention within the Czech Republic.

2. COUNTRY BASELINE – CZECH REPUBLIC

2.1 Country Profile

Information contained in this chapter has not changed since the submission of the original National implementation plan in 2005; therefore the text of this chapter is not included in this up – dated version. Please refer to the text of the original NIP.

2.2 Institutional, political and legal framework

2.2.1 State environmental and sustainable development policy and general legislative framework

The reduction of the burden caused by persistent organic pollutants on the environment and population is one of the objectives of the updated State Environment Policy (SEP) approved by the Czech Government through Government Regulation No 235/2004 Coll., of 17 April 2004. The SEP acknowledges that an internationally coordinated approach is the only effective way to solve global environmental problems, among which the burden due to POPs indisputably belongs.

The SEP proposal for the period 2012 – 2020 includes the achievement of those commitments bringing the most effective improvement of the conditions and quality of the environment in respect of Parties' responsibilities arising from the ratification of multilateral environmental agreements on chemicals and waste, including the Stockholm Convention on persistent organic pollutants.

The Czech Republic accepts its share of responsibility for the state of the environment on Earth and asserts its international obligations regarding the POPs issue. The Czech Republic acts in accordance with the conclusions of the World Summit on Sustainable Development which took place in Johannesburg, South Africa in September 2002 and the UN Conference on Sustainable Development held in Rio de Janeiro in 2012. The Czech Republic also supports the implementation of the Stockholm Convention through its international development cooperation, in accordance with the 2010 – 2017 Strategy.

The Czech Republic is a Party not only to the Stockholm Convention but also to many other multilateral environmental agreements related to area of chemical management: the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal, the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Dangerous Chemical Substances and Pesticides in International Trade, the Protocol on persistent organic pollutants (hereinafter only referred to as the "Protocol") under the ECE Convention on Long – Range Transboundary Air Pollution. Through the ratification of the Convention, the Czech Republic confirmed its interest in participating in internationally coordinated environmental protection and human health protection from the effects of persistent organic pollutants.

The Czech Republic is a Member State of the European Union and shares its legal framework. Details are listed in the chapters 2.2.3 and 2.2.4.

2.2.2 Roles and responsibilities of ministries, agencies and other governmental institutions involved in POPs management and their respective resource allocation

The Act of the Czech National Council No 2/1969 Coll., establishing ministries and other central bodies of the state administration of the Czech Socialist Republic, in the wording of later regulations, established the MoE on January 1st, 1990 as the central authority of the state administration and the highest national inspection authority in all environmental issues. Pursuant to this Act, the Ministry of the Environment is the central body of the state administration, among others, for the protection of natural water accumulation, protection of water sources and of the quality of surface and ground waters, air protection, waste management, environmental impact assessment of activities and their consequences, including transboundary impacts and the State Environmental Policy.

The Ministry of the Environment of the Czech Republic (MoE) is also the central administrative authority and carries out supreme state supervision in other areas, including the handling of chemical substances and chemical preparations and the prevention of serious accidents. It is also the central body of the state administration for the coordination of international cooperation in environmental issues. Furthermore, the MoE is responsible for providing a uniform environmental information system within the territory of the Czech Republic,

including a broad – range monitoring. The organizational structure of the MoE corresponds with all the listed responsibilities.

To support the implementation of the Stockholm Convention and activities related to POPs in general, the Minister of Environment established the National Centre for persistent organic pollutants in November 2006 (hereinafter referred to only as „National POPs Centre“), which acts as the advisory expert board for activities linked with the issue of POPs and commitments arising from multilateral international agreements dealing with chemical substances and waste issues. The National POPs Centre was established under the Research Centre for Toxic Compounds in the Environment (formerly named Research Centre for Environmental Chemistry and Ecotoxicology) of the Masaryk University in Brno and cooperates with leading Czech experts from various sectors and with institutions engaged in the POPs field, such as the National Reference Laboratory for POPs, the NIPH, the Water Management Research Institute, the Institute of Chemical Technology in Prague (ICT in Prague), the Central Institute for Supervising and Testing in Agriculture (CISTA) or the Czech Hydrometeorological Institute (CHMI). In October 2007, the Scientific Council of the National POPs Centre was established, which is composed of the Chair of the National POPs Centre Council, National POPs Centre representatives and further also representatives of all scientific institutions engaged in the study of POPs (universities, Academy of Sciences of the Czech Republic, CHMI, National Institute of Public Health (NIPH), State Phytosanitary Administration (SPA), etc.).

Activities of the National POPs Centre are supported and coordinated by the National POPs Centre Council (hereinafter referred to only as “Council”). The Council was established by the Order No 27/2006 of the Minister of the Environment as an advisory authority of the MoE. It acts as the interdepartmental authority for the coordination of activities connected to the POPs issue, for national responsibilities linked with the Stockholm Convention and for the implementation of international conventions dealing with chemical substances and its integral connection with the fulfillment of commitments of the Czech Republic. The Council is composed of representatives of the MoE, the Ministry of Health, the Ministry of Agriculture, the Ministry of Industry and Trade, the Ministry of Defense, the Ministry of Education, Youth and Sports, the Ministry of Finance, as well as the Ministry of Transport. The Council members support their commitments from individual responsibilities and tasks as listed in the Plan and in accordance with department relevance. Furthermore, also cooperating with the Council are representatives of the State Office for Nuclear Safety, the Institute of Chemical Technology in Prague, the Masaryk University in Brno, Emergency Services and Rescue Services, the Academy of Sciences of the Czech Republic, the Confederation of Industry of the Czech Republic, Confederation of Chemical Industry of the Czech Republic, CENIA – the Czech Environmental Information Agency, the Green Circle – Specialized Platform of Environmental NGOs, as well as the International POPs Elimination Network (IPEN).

To carry out the State inspection on air and water protection, waste management and forest and landscape protection, Act No 282/1991 Coll., on the Czech Environmental Inspectorate its jurisdiction in forest protection established the Czech Environmental Inspectorate (CEI) as a body of the state administration having its head office in Prague, which is subordinate to the MoE. The Unit of Waste Management of the CEI is enrolled into the import and export supervision of hazardous waste (TFS – Transfrontier Shipment of Waste). Regional inspectorates of the CEI have been established to implement state administration in the following regions: Prague, České Budějovice, Plzeň, Ústí nad Labem, Liberec, Hradec Králové, Havlíčkův Brod, Brno, Olomouc and Ostrava, along with two subdivisions in Zlín and Karlovy Vary. The bodies of the Inspectorate carry out supervision to the extent specified by the laws of the Czech Republic, and decisions of administrative bodies in environmental matters, determine inadequacies and damage to the environment, the causes thereof and persons responsible for the occurrence of such damage. They supervise the elimination of determined inadequacies and impose suitable measures for remediation. The Inspectorate sets fines to be imposed for damaging the environment, makes decisions on the amounts of charges for depositing waste in landfills, for air pollution caused by large and medium pollution sources, and deals with complaints from individuals and organisations. Regional authorities, municipal authorities with extended competency or municipal authorities set charges for air pollution. CEI is authorized to order the termination of production or other detrimental activities endangering the environment until the inadequacies and their causes are eliminated.

The State Environmental Fund of the Czech Republic (SEF CR) was established in order to implement the national environmental policy as one of the financial sources for the support of the protection and improvement of the environment of the Czech Republic. The SEF CR obtains its financial resources, among others, from fees collected from polluters, including waste water discharge fees, fees for reclassifying agricultural land, air pollution fees from waste deposition. Other financial sources include the state budget, donations, etc. The expenditure of SEF CR is regulated by Act No 388/1991 Coll., on the State Environmental Fund of the Czech Republic and its implementing regulations.

State administration in the environmental protection sector is carried out through jurisdiction delegated to the Municipal and Regional Authorities.

The professional aspects of the work of the MoE in carrying out state administration are supported and provided for the organizations receiving contributions from the state budget; such organizations provide research, development, information and monitoring within this sector.

The Czech Hydrometeorological Institute (CHMI) is active in the fields of meteorology, climatology, hydrology, and in the air protection. It establishes and operates monitoring stations and relevant networks for the monitoring of quantitative and qualitative atmosphere and hydrosphere conditions and the causes leading to their pollution or destruction, processes the results of measurements, compiles and provides forecasts of meteorological conditions, and operates the state meteorological service.

The Czech Environmental Information Agency (CENIA) is a budgetary organization of the MoE of the Czech Republic and its mission is to collect, review, interpret and distribute information on the environment, as well as to compile and provide documents for the state administration execution. CENIA manages the Integrated Pollution Register (IPR) and functions as the national notifier. The Agency for Integrated Prevention (AIP) is part of CENIA. The purpose of AIP is to provide the state administration with professional support in the area of integrated prevention in accordance with Act No 76/2002 Coll., on integrated pollution prevention and control (IPPC). CENIA is in charge of the integrated system of reporting obligations (ISPOP) which ensures the fulfillment of mandatory reporting legislation on the environment. Data output of CENIA is the Information System Statistics and Reporting Environment (ISSaR), which contains a clearly defined set of all statistical data and environmental indicators. Furthermore, CENIA manages mappings services Public Administration Portal, which represent the practical application of environmental data. CENIA is Czech Republic's focal point of the European Environment Agency (EEA) and is involved in the European Information and the Environmental Observation Network (Eionet).

The T. G. Masaryk Water Management Research Institute (T.G.M. WMRI), public research institute, carries out complex studies on the subject of water as a component of the environment. The scope of its work is, among, others, aimed at research of the status, use and changes in aquatic ecosystems and their relations with landscape and related environmental risks, waste and packaging management and it also provides professional basis for water management in this sector. The Centre for Waste Management is a part of the T.G.M. WMRI, and provides professional support to the Waste Department of the MoE, namely in respect of providing for the continuity of data for the updating of national legal regulations in compliance with EU legislation.

The mission of the Czech Geological Survey (CGS, formerly known as the Czech Geological Institute) is to operate the state geological service in the Czech Republic. It collects processes and assesses data on the geological composition of the state territory and provides the political, administrative and ecological decisions to the authorities. It also provides regional geological information to all parties concerned. Furthermore, it develops methods for geological research and related laboratory practice.

The Nature Conservation Agency of the Czech Republic (NCA CR) was established to provide the maintenance of records of the central fund for nature conservation and landscape protection in specially protected areas, to issue viewpoints and expert reports for the state administrative bodies and other legal and personal entities, to provide inventories of investigations, and plans for care to protected territories. The NCA's scope of operations also include carrying out professional scientific research and expert work with regard to environmental protection, collection of relevant documents, coordination of landscaping programs and the implementation of measures for the protection of nature, landscape and natural heritage. The scope of authority of the NCA CR in the context of provision of state authority execution is lined to the Protected Landscape Areas, National Nature Reserves, National Nature Monuments and their protected zones. NCA CR Regional Offices act as professional departments for the compilation of professional analyses and viewpoints and provide basis for natural protection state administration for individual regions and municipalities (Municipal Authorities). They are also involved in the administration of landscape programs.

The National Park Administration (Krkonose National Park, Podyjí National Park, Šumava National Park and Protected Area, České Švýcarsko National Park) and the Administrations of Protected Landscape Areas carry out state administration within their respective territories in forest management, game keeping, fish – breeding, fishing, and protection of the agricultural land fund, which are otherwise the responsibilities of the Municipal Authorities. Furthermore, they also are active in environmental monitoring, management and carrying out professional, methodic, documentation, as well as information activities in National Parks within their territory, their protection zones or relevant Protected Landscape Areas and also in the field of general landscape and environment protection. Protected Landscape Area Administrations act as administrative offices, as well as regional offices of the NCA CR.

The Ministry of Industry and Trade of the Czech Republic (MIT) cooperates with the MoE in the provision of advisory services to producers, importers, consecutive users or other participating entities in respect of their obligations and responsibilities according to EU regulations and informs the public about substance risks pursuant to Regulation (EC) No 1907/2006 of the European Parliament and the Council on the Registration, Evaluation, Authorization and Restriction of Chemicals (REACH). The MIT actively cooperates in the process of

implementation of the Stockholm Convention and fulfills its responsibilities related to the POP issue. It also takes part in the carrying out of the National Implementation Plan connected to the implementation of measures designed to reduce POPs pollution into all components of the environment, namely in the field of production, market introduction, the use of POPs in recycled products, etc.

The Czech Trade Inspection Authority (CTIA) is an administrative government institution which falls under the jurisdiction of MIT of the Czech Republic. The CTIA was established under Act No 64/1986 Coll., on the Czech Trade Inspection Authority. The CTIA monitors businesses and individuals, who supply goods to, or sell goods on the Czech market, provide services or similar activities on the domestic market, unless as a result of special legislation, these activities fall under the authority of another administrative institution. Along with the right to impose financial penalties, the CTIA also imposes bans on the sale of products or their introduction onto the Czech market, if these products do not comply with Czech regulations.

The Czech Office for Standards, Metrology and Testing (OSMT) was established by the Czech National Council Act No 20/1993 Coll., on the Organization of the State Administration in the Field of Standards, Metrology and Testing as the state administrative body responsible for such activities. Responsibilities of the OSMT are stipulated by Act No 22/1997 Coll., on the Technical Requirements of Products and Act No 505/1990 Coll., on Metrology, as later amended, and its responsibilities further arise from relevant resolutions of the Government and international treaties by which the Czech Republic is bound. The key mission of the OSMT is to coordinate and ensure the proper meeting of obligations in accordance with legislation dealing with technical standardization and metrology and meeting technical standards and norms of the Czech Republic, as well as those related to European and international standards. Since 2009, the OSMT has also been responsible for the development and publication of national technical standards.

The Ministry of Health of the Czech Republic (MH) is the guarantor of Act No 258/2000 Coll., on Public Health Protection, as last amended. It continuously assesses the health risks and the effectiveness of measures proposed in the Plan in relation to human health protection. Regional hygienic stations and health institutions also are involved in these tasks. The National Reference Laboratory, including the National Reference Laboratory for POP Analysis is involved in this area, as well. Furthermore, it also provides the execution of tasks in the field of health protection as defined by Act No 201/2012 Coll., on Ambient Air Protection and by Act No 185/2001 Coll., on Waste, as amended.

The National Institute of Public Health (NIPH), through the Centre for the System of monitoring of the environmental impact on population health provides objective information on population exposure and health burdens as well as the environmental health risks of selected POPs in individual subsystems. The data obtained within this monitoring system provides important information for the Health Impact Assessment. The Health Risk Assessment forms an integral part of the complex monitoring studies, among others of chemical substances and compounds and in the field of air protection and wastes. Within the framework of basic and applied research and in cooperation with national experts as well as with professionals from abroad, it executes epidemiological studies of selected population groups.

The Ministry of Agriculture of the Czech Republic (MA) is the central authority for agriculture and food processing with regard to POPs. Monitoring and reduction of POPs in the agricultural sector involves the handling of pesticides controlled by the State Phytosanitary Administration (SPA) of the Czech Republic. The Central Institute for Supervising and Testing in Agriculture (CISTA) monitors the presence of pollutants in soil and fertilizers in the agricultural sector. The SPA mainly focuses on legislation, international relations, protection of the country's territory from harmful organisms extremely dangerous to plants in international trade as well as at the domestic level, the diagnostics of such organisms, registration of preparations for plant protection and post – registration control and monitoring of their placement on the market and usage (in compliance with Directive 91/414/EEC), including application technologies and registration thereof, control of the compliance with Phytosanitary regulations, monitoring of pests and aetiological agents in the territory of the Czech Republic, and furthermore, in the development of information systems, collection of important phytosanitary data and numerous other activities.

The Customs Offices (under the Customs Administration of the Czech Republic) are responsible for the control of import, export and introduction of controlled substances and products containing these controlled substances onto the domestic market and the supervision over the introduction of fluorinated greenhouse gases and products containing these substances to the market. Furthermore, they make motion to inspection in case of violation of control procedures and they impose penalties in case of violation of legal obligations or relevant regulations. Relevant information exchange and cooperation with the MoE, as defined by Czech and EU legislation, also forms the scope of their work. Allocation of financial sources is dealt with through cooperation with individual ministries and institutions according to their entrusted responsibilities.

2.2.3 International Commitments and Obligations

The Czech Republic has been a Member State of the European Union (hereinafter referred to as “EU”) since the 1st of May 2004. In compliance with EU primary legislation shared competence between the EU and its Member States is applied in the environmental sector (along with other sectors), which is applied even after the Lisbon Treaty has come into effect. Shared competence authorizes the Czech Republic to adopt its own legislation in this sector, which stays in line with EU law and only in so far as the EU has not exercised, or has decided not to exercise, its own competence. The Czech Republic is eligible to influence the concrete form of individual statutory instruments through its active participation within the EU Council, as well as through its members of the European Parliament.

The Czech Republic as a member of the **United Nations** (UN) participates in the United Nations Environment Programme (UNEP). At the same time it is a party to many multilateral environmental conventions in the framework of UNEP: the Convention for the Protection of the Ozone Layer (Vienna Convention), the Protocol on Substances that Deplete the Ozone Layer (Montreal Protocol), the Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal (Basel Convention), the Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC – Rotterdam Convention) and the Stockholm Convention on persistent organic pollutants, of which it has been a bureau member representing the Central and Eastern Europe Region from 2007 to 2013. The Czech Republic also participates in the UN Framework Convention on Climate Change (UN FCCC) and Kyoto Protocol. At the same time, the Czech Republic has been involved in the negotiations on the new legally binding international agreement on mercury. Since 2010, the Czech Republic has had its member in the Intergovernmental Negotiating Committee bureau, in which it represents the Central and Eastern Europe Region.

The Czech Republic is a member state of the **UN Economic Commission for Europe** (UN ECE) and is a Party to the majority of environmental conventions in the framework of the UN ECE: the ECE Convention on Long – range Transboundary Air Pollution (CLRTAP) and its 8 Protocols. A representative of the Czech Republic was elected to the Steering Committee of the European Monitoring and Evaluation Programme (EMEP). The Czech Republic also ratified the Convention on Environmental Impact Assessment in a Transboundary Context (Espoo Convention), the Convention on the Protection and Use of Transboundary Watercourses and International Lakes and the Convention on the Transboundary Effects of Industrial Accidents. The Czech Republic also is a party to the Convention on Access to Information and Public Participation in Environmental Decision – Making (Aarhus Convention) and its Protocol on Pollutant Release and Transfer Registers (PRTR Protocol), which is the first international legally binding agreement on the register of pollutant release and transfer. Furthermore, the Czech Republic is also a Party of the European Landscape Convention.

The Czech Republic has been a member state of the **Organisation for Economic Co – operation and Development** (OECD) since 1995. The MoE participates in the activity of the Environment Policy Committee (EPOC), and through its participation in the EPOC working groups contributes to the preparation of strategic OECD documents, especially in the field of sustainable development and green growth, including development indicators, chemical substances and waste, climate change, economic instruments and eco – innovation, assessment, environmental development and policy individual states and environmental outlooks. In 2002, the Czech Republic became a member of the European Environmental Agency (EEA).

2.2.4 Existing legislation on POPs addressing various stages of their life cycle management, contaminated sites, wastes, waste water discharge and point source air emissions

The Stockholm Convention was issued in the Czech language in 2006 in the Multilateral Agreements Collection as a Notification of the Ministry of Foreign Affairs No 40/2006 Coll. The adoption of Annex G has been issued as Notification No 24/2007 Coll. and further amended by the Notification No 50/2010 Coll. Amendments of the Stockholm Convention adopted in 2009 on listing 9 new chemical substances, were issued as Notification No 90/2010 Coll.

National legislation related to POPs, with the exception of the framework legislation directly connected to chemical substances and chemical preparations may be further divided into chapters: air protection, water, soil, waste and food/foodstuffs as listed in the subsections below.

2.2.4.1 Legislation on chemical management

The key approaches and procedures for the handling of chemical substances and pesticides in relation to POPs are as follows: classification, assessment/evaluation, packaging and inspection of chemical substances and pesticides and also comprise another field – prevention of major/industrial accidents.

The overall chemical management is dealt in with by the **EU chemical policy**, which also contributes to the control and reduction of POPs transfer and releases to the environment. The key legal instrument is the **Regulation (EC) No 1907/2006 of the European Parliament and the Council on 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 and 2000/21/EC (so called REACH Regulation). The next key legislation is the **Regulation (EC) No 1272/2008 of the European Parliament and of the Council on Classification, Labelling and Packaging of Substances and Mixtures**, amending and repealing Directives 67/548/EEC and 1999/45/EC, and amending Regulation (EC) No 1907/2006 (so called CLP Regulation).

In addition, the key EU legislation dedicated to POPs is the directly applicable **Regulation (EC) No 850/2004 of the European Parliament and of the Council on persistent organic pollutants** and amending Directive 79/117/EEC. The POPs Regulation lays down measures for eliminating the POPs production, placing POPs on the market, their use, unintentional releases and waste generation containing these pollutants or that have been contaminated by them. It represents the EU legal framework for meeting obligations of the Stockholm Convention on POPs and the Protocol on POPs (1998) to the Convention on the Long – Range Transboundary Air Pollution (CLRTAP) Convention. This Regulation also forms the key legal basis for the actions and activities in the National implementation plan.

This regulation was further amended among 2006 – 2010 as follows:

EU Council Regulation (EC) No 1195/2006, amending the Annex IV of the Regulation No 850/2004

EU Council Regulation (EC) No 172/2007, amending the Annex V of the Regulation No 850/2004

Commission Regulation (EC) No 323/2007, amending the Annex V of the Regulation No 850/2004

Commission Regulation (EC) No 304/2009, amending the Annexes IV and V of the Regulation No 850/2004 with regards to the processing of waste containing POPs in energy and metalurgical processes

Commission Regulation (EC) No 756/2010, amending the Annexes IV and V of the Regulation No 850/2004

Commission Regulation (EC) No 757/2010, amending the Annexes I and III of the Regulation No 850/2004,

and Commission Regulation (EC) No 519/2012, amending the Annex I of the Regulation No 850/2004

Legislation concerning management of chemical substances

Act No 350/2011 Coll., on chemical substances and chemical preparations and on an amendment to certain other acts

Decree No 402/2011 Coll., on evaluation of dangerous properties of chemical substances and chemical preparations packaging and labelling of dangerous chemical preparations

Decree No 162/2012 Coll., on name formulation for a dangerous chemical substance in the designation of dangerous chemical preparation

Decree No 163/2012 Coll., on the principles of good laboratory practice

Legislation focused on pesticides

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 May 31, 2004

The following regulations implementing this act and concerning phytosanitary care preparations were issued:

Decree No 327/2004 Coll., on protection of bees, game, water organisms and other non – target organisms in the use of plant protection preparations

Decree No 33/2012 Coll., which amended Decree No 327/2004 Coll., on protection of bees, game, water organisms and other non – target organisms in the use of plant protection preparations

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

Decree No 273/1998 Coll., on sampling and analysis of fertiliser samples

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

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 59/2006 Coll., concerning prevention of major accidents caused by selected dangerous chemical substances or chemical preparations and concerning amendment of Act No 258/2000 Coll., concerning the protection of public health and concerning the amendment of certain associated acts, as subsequently amended, and Act No 320/2002 Coll., concerning the amendment and cancellation of certain acts in connection with the termination of activities of district authorities, as subsequently amended, (Major Accident Prevention Act)

Act No 488/2009 Coll., amended Act No 59/2006 Coll., concerning prevention of major accidents caused by selected dangerous chemical substances or chemical preparations and concerning amendment of Act No 258/2000 Coll., concerning the protection of public health and concerning the amendment of certain associated acts, as subsequently amended, and Act No 320/2002 Coll., concerning the amendment and cancellation of certain acts in connection with the termination of activities of district authorities, as subsequently amended, (Major Accident Prevention Act)

Decree No 256/2006 Coll., concerning details of the system for the prevention of major accidents

Decree No 255/2006 Coll., which designates the scope and method of the processing of a major accident report and final report of the incidence and consequences of a major accident

Decree No 250/2006 Coll., which designates details concerning the scope of safety measures of physical protection of establishments or installations classified in group A or B

Direct relation to the Act has also:

Government Regulation No 254/2006 Coll., providing for hazardous substances inspection

Decree No 103/2006 Coll., which designates fundamentals for designating an accident planning zone and the scope and method of preparing an external emergency plan

2.2.4.2 Legislation concerning the air

To the new act on protection of the air, which come into force on 1st September 2012, is to be expected during following weeks and months the publication of many others executive regulations (here are stated just ones currently valid):

Act No 201/2012 Coll., on protection of the air

Government Regulation No 446/2011 Coll., on the sustainability criteria of biofuels

Decree No 312/2012 Coll., on laying down requirements on the quality of fuels used for inland and marine vessels from the point of view of air protection

2.2.4.3 Legislation concerning the soil

Act No 334/1992 Coll., on the protection of the agricultural land fund in the wording of later regulations

Decree No 13/1994 Coll. setting forth the details of the protection of the agricultural land fund

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 detection and remedying of environmental damage of soil

Straight binding has also Act on fertilizers as mentioned above in the part devoted to pesticides

2.2.4.4 Legislation concerning water resources

Act No 254/2001 Coll., on waters and amendments to some acts, in the wording of later regulations, and its implementing regulations

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 98/2005 Coll., which establishes the rapid alert system on the risk of danger to health from foods and feeds

Government Regulation No 416/2010 Coll., on the characteristics and the level of acceptable pollution of waste water and on permit for discharge of wastewater into groundwater

Government Regulation No 23/2011 Coll., amending Government Regulation No 61/2003 Coll., on indicators and limits of surface water and waste water pollution, requirements of permits to discharge waste waters into surface waters and sewerage systems and on vulnerable areas

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

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

Government Regulation No 262/2012 Coll., on the determination of vulnerable areas and the action programme

2.2.4.5 Legislation concerning waste management

Act No 185/2001 Coll., on wastes and amendments to some other acts, in the wording of later regulations

With Act on wastes were adopted many other regulations (here are stated just ones currently valid):

Act No 477/2001 Coll., on packaging, in the wording of later regulations

Government Regulation No 197/2003 Coll., on the Waste Management Plan of the Czech Republic

Decree No 376/2001 Coll., on the evaluation of hazardous properties of wastes, in the wording of later regulations

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), in the wording of Decree No 503/2004 Coll.

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), in the wording of later regulations

Decree No 382/2001 Coll., on conditions for the use of treated sludge on agricultural land, in the wording of Decree No 504/2004 Coll.

Decree No 383/2001 Coll., on the details of waste management, in the wording of later regulations

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 PCBs)

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., concerning details on e – waste management and on the detailed conditions of its financing

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 No 352/2008 Coll., regarding end – of – life vehicles

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 rechargeable batteries and on amendment of Decree No 383/2001 Coll., on details of waste management, as subsequently amended

2.2.4.6 Legislation concerning foods/foodstuffs

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 277/2010 Coll., which canceled Decree of the Ministry of Health No 273/2000 Coll., laying down the marginal permissible residual limits for veterinary medicaments and biologically active substances used in the manufacturing of foods and raw material for foodstuffs, in the wording of later regulations

2.2.4.7 Horizontal legislation

Act No 76/2002 Coll., on integrated pollution prevention and control, the integrated pollution register and amendments to some acts (Act on Integrated Prevention) in the wording of later regulations

Act No 25/2008 Coll., on the Integrated Environmental Pollution Register and the Integrated System of Compliance with Reporting Duty in Environmental Areas, and on amendments to other acts

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 in the wording of later regulations

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) in the wording of Act. No 93/2004 Coll.

Act No 258/2000 Coll., on protection of public health and amending some related acts, in the wording of later regulations

Government Regulation No 361/2007 Coll., on the protection of employee health at the workplace, in the wording later regulations

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

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., the prevention of environmental damage and its remedy, as related regulations

Government Regulation No 295/2011 Coll., a method for assessing the risk of environmental damage and further conditions of financial security

2.3 Assessment of POPs in the Czech Republic

2.3.1 Assessment of POPs pesticides (Annex A, Part I chemicals): historical, current and projected future production, use, import, and export; existing policy and regulatory framework

This chapter did not see any changes in the period of 2006 – 2011. Please refer to the former NIP (EN version 2006).

2.3.2 Assessment of PCBs (Annex A, Part II chemicals)

Text in chapters 2.3.2.1 – 2.3.2.5 has not changed. Please refer to the former NIP (EN version 2006).

2.3.2.6 PCBs Inventory situation up to 2011

As of 31st December 2001, the PCB inventory according to the Decree No 391/2000 Coll. contained on 5575 registration sheets yielded a total of 16136 devices: 1 660 transformers, 11 228 condensers and 2 611 other devices. However, a total amount of the operational fluids containing PCBs in the registered devices – as well as other data – could not be determined precisely. Nevertheless, current state has significantly changed.

Based on the national PCBs inventory (continuous), waste PCBs and devices containing PCBs, priority PCB pollutants are those stored in closed systems, in particular condensers and transformers – electric devices.

Guideline for sampling of oils (fluids) from electric devices (coils) for PCBs registration as of 2008 (Guideline by Waste Management Department No 7, MoE Journal No 4/2008) has significantly simplified and accelerated finalization of the PCBs inventory in the Czech Republic as well as diminished costs of relevant enterprises/legal persons needed to perform analyses of those fluids in electric devices.

As of 30th April 2009, the Czech Republic had a total of 16390 electric devices in operation that contain PCBs (confirmed evidence) and that must be eliminated by the 31st of December 2010 the latest. The total weight of fluids in those devices is about 9193 oils contaminated by PCBs and additional unidentified 7 tons of devices with PCBs.

Registration/Evidence on operation or of ownership of a device containing PCBs is performed via integrated system of reporting requirements (ISPOP, www.ispop.cz).

Inventory details are provided in Table 4 summarizing current situation for devices containing PCBs and devices potentially containing PCBs as of the 30th of April 2011.

As of the 30th of April 2011 the Czech Republic has 132 subjects/legal persons that own or operate devices and chemicals containing PCBs.

Ministry of Defense/Czech Army have finalized PCB inventory of devices with PCB filling larger than 5 litres in September 2007. In addition, there are other devices that are not used publicly and determination of the PCB content is more difficult as information is not readily available and classified at various levels.

2.3.2.7 Conclusions

PCBs have not been produced in the Czech Republic since 1984. They are neither imported nor exported to the Czech Republic (banned by the Act No 297/2009 Coll. amending the Act No 185/2001 Coll on wastes and on other legislation as amended). The inventory has shown that 99% of existing devices with PCBs are condensers; 112 pieces of transformers contaminated by PCBs.

About 110 of those could be just decontaminated or even used after 2010 as the concentration of PCBs therein does not exceed 500 mg/kg PCBs (unchanged limit allowed after 2010 in transformers in line with Act on Wastes and EU legislation in force).

Records reported into the Integrated system on implementation of waste management (ISOH, <http://isoh.cenia.cz/groupisoh/>) shown that 101.59 t of waste insulation oils or heat transfer oils containing PCBs (code of the waste catalogue 130301) were eliminated (D10) and 4913.5 t of wastes containing PCBs (code 500118) a 179.04 t of transformers and condensers containing PCBs (code 160209) in 2010.

Additional 118.32 tons of PCBs from transformers and condensers were treated (codes R1 to R11 (R12)) and 158.48 tons were physic – chemically treated (D9).

2.3.3 Assessment with respect to DDT (Annex B, Part II chemicals)

This chapter did not see changes during 2006 – 2011. Please refer to the former NIP (EN version 2006).

2.3.4 Assessment of releases of unintentionally produced chemicals (Annex C chemicals – PCDDs/Fs, HCB and PCBs)

Pentachlorobenzene was listed to the Annex C by the 4th meeting of the Conference of the Parties of the Stockholm Convention.

Original compounds – dioxins, furans and hexachlorobenzene – did not experience any changes in the range and composition of their sources. Please refer to the former NIP (version 2005).

Table 4 Inventory of PCB facilities or facilities potentially containing PCBs as of 30 April 2011

Device	Code	Device contains PCBs: Yes			Device contains PCBs: questionable		
		Items	Weight of the filling [kg]	Weight of the filling [t]	Items	Weight of the filling [kg]	Weight of the filling [t]
Power transformer	10	3863	1188988	1188.988	15262	9504631	9504.631
Coil	11	4	10541	10.541	72	91500	91.5
Reactor	12	0	0	0	0	0	0
Electrofilter transformer (separator)	13	0	0	0	21	15401	15.401
Bushing	14	0	0	0	0	0	0
Tapping switch (in the transformer)	15	0	0	0	21	6600	6.6
Instrumental (measuring) tension transformer (PTN)	16	0	0	0	47	4951	4.951
Instrumental (measuring) current transformer (PTP)	17	0	0	0	49	4553	4.553
Instrumental (measuring) combined transformer (PTK) – tension + current	18	0	0	0	12	1035	1.035
Condenser (DZ)	20	2914	49537.3	49.5373	2863	31151	31.151
Condenser battery (MZ)	21	3	4627	4.627	0	0	0
Engine (MZ)	22	0	0	0	0	0	0
Switchboard (MZ) Cubicle switchboard	23	0	0	0	0	0	0
Switch	25	9	141	0.141	2150	24845	24.845
Other electric devices with liquid dielectric	30	0	0	0	1630	624286.1	624.2861
Hydraulic mining device	40	0	0	0	1057	244107.5	244.1075
Vacuum pump	50	0	0	0	0	0	0
Industrial device with heating by a heat transfer fluid (duplicator, plant mixing tarmacadam etc.)	60	1	600	0.6	0	0	0
Other device	70	0	0	0	497	225607	225.607
Container with the operational fluid containing PCBs	81	0	0	0	18	155933	155.933
Tank with the operational fluid containing PCBs	82	0	0	0	0	0	0
Barrel with the operational fluid containing PCBs	83	0	0	0	1	200	0.2
Other means of storage for operational fluids with PCBs	90	2	832000	832	0	0	0
Grand total		6796	2086434.3	2086.4343	23700	10934800.6	10934.8006

2.3.5 Assessment of polybrominated diphenyl ethers, PBDEs (Annex A, Part IV (hexa- and heptaBDE) and Part V (tetra- and pentaBDE) chemicals) and hexabromobiphenyl, HBB (Annex A, Part I chemicals)

Hexabromobiphenyl has never been used in the Czech Republic nor had it been registered as pesticides. There is no available information on its levels in the environment of the Czech Republic.

Brominated diphenylethers are represented by the abbreviation PBDEs. They consist of 209 different chemicals with similar structure and properties/characteristics. They can be divided into three groups based on the amount of bromine in each molecule. Penta BDEs (5 bromine atoms, melting point – 3°C to – 1°C, water solubility 2 µg/L to 15 µg/L (20°C). octaBDE (8 atoms of bromine), and decaBDE (10 bromine atoms, the melting point is 294 – 296°C, boiling point is 572°C and density is 3364 kg.m⁻³, almost insoluble in water, but well soluble in organic solvents) are the only commercially available PBDEs. Substances with 5 bromine atoms in the molecule, pentabromodiphenyl ethers, are the most significant ones.

Commercial mixture “pentabromodiphenyl ether“(penta BDE) is a dense, oily liquid or semi – solid substance of dark yellow colour. It decomposes above 200°C. It is fully inflammable, almost insoluble in water but mixes with paraffin oil or other organic solvents and therefore it is used as flame retardant.

2.3.5.1 Production, import, export and use

We can conclude that polybrominated diphenyl ethers and hexabromobiphenyl are neither produced in nor imported into the Czech Republic based on information in the Table 3.

PBDE use is determined fully by their properties. Inflammability and self – flame retardancy are their most significant properties. Therefore, pentaBDE is used as flame retardant in flexible polyurethane foam for production furniture and upholstery and to a lesser extent; it may be used in solid plastic materials and glues. The chemical usually represents up to 10% by weight of the final product.

Production of pentaBDE was phased out in the EU countries in 1997 and consequently the sale in the EU in 1999 did not exceed 210 tons.

OctaBDE and deca BDE were used together with antimone oxide as a flame retardant in solid plastic materials for car production and in making electric and electronic appliances. EU has a valid ban on sale and use of pentaBDE and octaBDE in all fields/areas since August 2004.

2.3.5.2 Stockpiles, unused stocks, contaminated sites, and PBDEs in waste

In the Czech Republic, there is no information about stockpiles and unused stocks. In order, to identify possible sources of contamination and occurrences of PBDEs in waste in 2011, the MoE conducted a pilot study of materials suspected in containing of high level of brominated and fluorinated substances.

Subjects of the study were materials used particularly in the production of electronics, insulation materials, textile goods, and means of transport. Samples of the materials were obtained by collecting the older materials and purchasing the new ones in the network of the current stores. The aim of the study was to obtain a typical sample of different types of materials based on age and the area of application.

The pilot study resulted in an initial qualified appraisal of the situation. It can be seen, that the different types of materials (foam rubber, upholstery, monitors, keyboards, building materials, insulation) can have different level of contamination, greatly depending on the manufacturer. For a better assessment of the overall situation on the national level, it is necessary not only to obtain a larger database, but also to extend the study on other types of related compounds.

The pilot study included comparison of contamination level of the internal and external environment using passive samplers. Study of indoor air has proven significant influence of materials containing PBDEs, presented in the interior. For the risk assessment, it is necessary to carry out detailed study using fractionation of dust particles on singular components, using cascading impactor.

In terms of ecological and human risks, it could be recommended to monitor surroundings of electronic waste processing plants (brominated substances in dust, soils, sediments, perfluorinated substances in water and sediments), working environment (landfills, incinerators, waste sorting facilities, equipment for the recycling of electronic waste), and sewage treatment plants, since the urban area and wastewater sewage treatment technology fails to catch these substances.

In the internal environment, the primary sources of PBDEs are entertainment electronics, home appliances, computing electronics, insulation materials, and surface of textiles. Significant sources of PBDEs are also interiors of automobiles, aircrafts, and means of public transport. In spite of PBDEs banning, quick and notable reduction of the concentrations in the internal environment cannot be expected, because many of the products that contain PBDEs are still used.

2.3.5.3 Conclusions

PBDEs might be released into the environment during their production, application, and use of products that contain PBDEs, and finally, during their disposal. It is necessary to emphasize that PBDEs are less volatile and soluble; therefore, the main source of their release is the dust or particles arising from the products containing those substances. Many studies of local effects had shown that PBDEs may fundamentally threaten the healthy life of many, especially water organisms and thus disrupt the sensitive balance of the ecosystems.

Sources of emissions of PBDEs into the environment:

- Releases during manufacturing of PBDEs and other processing (production of polyurethane foams and plastics)
- Releases during processing of products containing PBDEs to final products (furniture)
- Release of PBDEs from the products, where they are contained (furniture, upholstery), during their use

– Release of PBDEs from the products, after the product containing PBDEs become waste and it is stored, burned or otherwise processed.

In addition, when PBDEs are excessively heated or burned very toxic substances may release, such as polybrominated dibenzodioxins and dibenzofurans (PBDDs/PBDFs).

As for the results of the pilot study on the national level, identified tasks on state of the contamination in the Czech Republic were translated into the corresponding action plans.

2.3.6 Assessment of PFOS, its salts and PFOSF (Annex B, Part III chemicals)

Perfluoroktansulfonan (PFOS) is fully fluorinated anion, which is commonly used in the form of salts in some applications or as part of large polymers. Perfluorinated compounds have exceptional physical and chemical properties that make them valuable for using in various sectors. These are chemically inert, highly heat – stable, hydrophobic (water resistant), and also oleophobic (oil resistant) substances. Due to these characteristics they are used as assisting agents during processing of surface treatment products for different objects, starting with production of semiconductors up to additives to fire – fighting foams. PFOA is also used as a supplementary agent in production of polytetrafluoroethylene, known rather under the names of Teflon, Gore – Tex or Scotchgard.

Properties, which are so useful in the above mentioned applications, at the same time are quite dangerous for the environment, if the leakage occurs. In normal conditions perfluorinated compounds does not undergo through the process of photolysis, hydrolysis, and biodegradation. PFOS and PFOA are final products of only partial degradation of other perfluorinated compounds. Both of these substances are very persistent in the environment. However, PFOS has higher bioaccumulative potential than PFOA. In regard to the unique physical properties, unlike current persistent organic pollutants (POPs), these substances do not store in the fat tissues, instead they bind to the protein component of the tissues (accumulation occurs mainly in the liver). As the presence of PFOS had been detected in organisms of birds, fish, and mammals, it is obvious that this substance may enter food chains. After entering the organism it is absorbed and distributed particularly in liver and body fluids; afterwards it is bound with protein component of the tissue.

These chemical substances are gradually discharged from the body; however, due to the permanent exposure to those chemicals, there is almost no chance for their complete elimination from the human body during its lifetime. It is estimated that half of the PFOS amount is discharged from the human body in around 9 years and PFOA in 1 – 3 years.

Higher levels of PFOS have been observed in the industrial and populated areas. It is alarming, that the presence of PFOS have been detected in the tissues of animals from the Arctic, far from the anthropogenic sources. These findings, together with the available toxicological data affected chemical industry that much, that in 2000, the world's largest producer of perfluorinated substances, the American company 3M voluntarily shut down the production lines.

2.3.6.1 Production, import, export and use

In the Czech Republic, these substances had never been produced. For this reason, there are no available data on their import, availability and consumption in the Czech Republic. However, the PFOS and related substances were detected in different parts of the environment and in biota (in particular, in fish) in the Czech Republic.

Perfluorinated substances with long carbon chains, containing PFOS, are both water and lipid repellents. Therefore, the PFOS related substances are used as active reagents on the surface, in a variety of applications. Extreme resistance of these substances makes it possible to use them in high – temperature applications and in contacts with strong acids and bases.

Historically, PFOS related substances were used as in the USA as in the EU:

- fire fighting foam
- carpets
- leather manufacturing
- upholstery
- paper processing
- coatings and coating additives
- industrial and household cleaning products
- pesticides and insecticides
- the use of the remaining stocks of fire – fighting foams
- photographic industry
- offset and semiconductors
- hydraulic fluids
- plating

2.3.6.2 Stocks, unused stockpiles, contaminated sites

The MoE of the Czech Republic has no available information about stockpiles. Since PFOS are used as useful fire – fighting agents, it is possible that there exist small unused stocks of fire – fighting devices.

PFOS have anthropogenic sources, as there are no natural sources of PFOS in the environment. Releases of PFOS and related substances occur throughout of their lifetime. They are released during their production, assembling into commercial products, distribution, industrial and domestic use, and even after their use, from the landfills and sewage treatment plants.

The fire – fighting training areas are the secondary sources of PFOS, due to the emissions from the fire – fighting foams. High levels of PFOS had been detected in the wetlands adjacent to such areas in Sweden (Swedish EPA, 2004), and also in groundwater near the training areas in the USA.

A leakage of perfluorinated sulfonyl compounds from utilizing of various products was predicted by the company 3M, which produces those compounds (3M Speciality Materials, 2002). For example, in case of clothing treated with home products (impregnation), 73% of these substances are expected to leak during 2 years of cleaning. When using aerosols, 34% of escape into the atmosphere is expected, while 12,5% of the original content remains in cans at disposal.

One of the ways of PFOS discharge into the environment is from the wastewater treatment plants and landfills, where elevated concentrations had been observed compared to the background concentrations. As soon as the PFOS are released from these cleaning devices, they are absorbed into the sediments and organic matters. Considerable amount of PFOS may also end up in agricultural soil, as a result of the application of waste sludge. Therefore, primary sources of PFOS are water, sediment, and soil.

Releases of PFOS into the environment is primarily happening through flows on surface water and ocean currents, air transport (volatile PFOS related substances), adsorption into particles (in water, sediment, and air) and through living organisms (3M). The greatest burden on the environment puts use of PFCs in water extinguisher foams (perfluoroalkylsulfonate 0.5 – 1.5%), which were used for extinguishing flammable substances.

PFOS had been found in the world in sediments, downstream from the production areas, at the discharge place and in the sludge from sewage treatment plants. Environmental toxicology data are known primarily for aquatic organisms such as fish, invertebrates and algae, and partly also for the birds. PFOS has low to moderate toxicity for aquatic organisms, but for example, for honeybees have been proven high acute toxicity.

In the years of 2005 – 2007, in the framework of the project NPV II (BIOBROM – 2B06151) and COST 636 funded by the Ministry of Education, Sports and Youth had being conducted a study "Perfluorinated contaminants in the aquatic ecosystem of the Czech Republic". The study was conducted in cooperation with ICT in Prague, Department of the Chemistry and Food Analysis, and the University of South Bohemia in České Budějovice, Research Institute of Fishing and Hydrobiology at Vodňany.

The aim of the study was to collect data on the burden extent of perfluorinated substances on the aquatic ecosystem of the Czech Republic. For the study purposes, liver samples of European chub (*Leuciscus cephalus*) and the freshwater bream (*Abramis brama*) were examined from 18 selected locations with various currents in the Czech Republic. The most frequently detected pollutant found in the liver of European chub was PFOS, in all watched locations, during all the studied years. Identified levels of contamination ranged from 10.1 to 198.5 $\mu\text{g kg}^{-1}$ of matrix. Found levels of PFOS in the liver of European chub, in the Czech Republic, match to published data on findings of PFOS in Europe, in liver of freshwater fish species, with pollution range from 5 up to 551 $\mu\text{g kg}^{-1}$ of matrix.

Examining the contaminated sites of the whole Czech Republic, it can be announced that the highest burden had been recorded in the areas of Northern Bohemia, in the localities situated around the middle flow of the river Elbe (Obříství) and the lower flow of the Vltava River (Zelčín), together with the locations of the Ohře – Terezín and the Elbe – Děčín. Due to the fact that the PFAS have not been produced and there is no information about the usage of PFAS in the Czech Republic, the origin of leakage cannot be identified.

In the following years, the monitoring of the aquatic ecosystem of the Czech Republic will continue, and it will not be only about the examining of liver of selected fish species, like European chub, fresh water bream, barbel, and European perch, but the study will be extended to other environmental matrixes, such as fish muscles, river sediment, freshwater and waste water, etc. Recent studies indicate the findings of PFOS and PFOA in the mother's milk. This matrix is a suitable indicator for estimation of the burden of those pollutants on the population.

2.3.6.3 PFOS in waste

In the years of 2010 – 2011, a pilot study has been carried out in the Czech Republic. There have been studied materials and objects for everyday use, where it was expected to find fluorinated substances, particularly in insulation materials, textile goods, means of transport, and during electronics' production. Study samples

represented materials used in the indoor environment, especially in common household and office spaces, where people spend a lot of time of their lives. These samples were obtained by collecting the older materials and also new pieces that were purchased in the current shopping networks. With regard to a limited number of samples major conclusions cannot be made.

In the selected materials, there occurred acids with shorter carbonaceous chain; these were PFBA, PFPA and sporadically, also PFHxA, PFHpA, and PFOA. From the toxicological point of view, significant PFOAs were presented in some samples of chipboards and OSB boards, with concentrations from the values below quantified limits up to the units of ng/g.

The concentration of PFOS in individual samples was different, but the pollutants were found in all groups of samples used in the study. Measured concentrations of PFOS vary 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.

Increased content of PFCs was expected in the electronic devices (computers, television). The highest concentration values were found in keyboard 3.97 ng.g^{-1} . However, there were differences in concentration of the same type of samples. In this study, we have also examined, whether the amount of PFCs was influenced by the age of the material, but it cannot be proved or disapproved according to available results.

2.3.6.4 Conclusions

In terms of ecological and human risk, it can be recommended to monitor per fluorinated substances in water and sediments, at the work environment (in the premises, where the Czech Republic has requested special exception), and also some wastewater treatment plants, in regard to the characteristics of PFOS. It would also be very interesting to monitor the burden and exposure on workers. Furthermore, it is also necessary to monitor the waste water from sewage treatment plants and to develop such technologies that will be capable to catch those substances during treatment of wastewater.

2.3.7 Information on the state of knowledge on stockpiles, contaminated sites and wastes, identification, likely numbers, relevant regulations, guidance, remediation measures, and data on releases from sites

The first national inventory of POPs dated 2003 – 2005 has identified a number of contaminated sites that should be treated urgently and their list is provided in Table 12 of the original Plan. State of implementation/completion of the first Plan is provided in its parts 2.3.2. and 2.3.7.3.

2.3.7.1 Guidelines and rules (legislation)

A systematic approach in addressing old ecological burdens is very important. Identified contamination can be considered as an old ecological burden, when the origin of the contamination does not exist or it is not known. Contaminated sites may have diverse nature: these can be waste landfills, industrial and agricultural areas, small establishments, unsecured stocks of dangerous substances, the former military bases or territories affected by mining and quarrying. Old ecological burden means serious contamination of soil, groundwater or surface water, due to the negligent handling of dangerous substances in the past (particularly, in case of petroleum substances, pesticides, PCBs, chlorinated and aromatic hydrocarbons, heavy metals, etc.).

Competences in this area are regulated by the Act No 2/1969 Coll., on establishment of ministries and other central bodies of the state administration in the Czech Republic. According to this act the Ministry of the environment (MoE) is a supreme supervising authority in environmental matters and is also the central authority for state environmental policy. The MoE and its department for environmental risks and ecological damages (section for rehabilitation) addresses the problems methodically and produces materials intended for all branches, that ensure the process of removal of old environmental loads, or rehabilitation of contaminated sites, in the framework of their competences. The process of removal/restoration/remediation is not funded from a central source, but handled by the individual departments independently. Department of environmental risks and ecological damage is an administrator and coordinator of the MoE procedures, according to the law on the prevention of environmental harm and remediation.

In 2008, unified national methodology was worked out, Methodological guidance of MoE No 14/2008, "Evaluation of priorities – categorization of contaminated and potentially contaminated sites".

According to this methodology, there were created regional and national lists of priorities on removal of old environmental burdens. The removal can be funded from the operational programme for environment 2007 – 2013, priority axis 4.2 – removal of old environmental loads, focused on the removal of serious, priority burdens on the environment. The financing plan will be created at the same time, as the process of the national inventory and planning of financing of all other burdens.

An overview of other methodologies and guidelines for the contaminated sites:

Methodological guidelines

- Methodological Guidelines of MoE, Pollution Indicators, version 2011
- Methodological Guidelines of MoE, Risk analysis of contaminated territories, Journal of the MoE No 3, March 2011
- Methodological Guidelines of MoE, Exploration of the contaminated territory, Journal of the MoE No 9, 2005
- Methodological Guidelines of MoE, Sampling at remediation geology, the journal of the MoE NO. 2, annex 2, 2007
- Methodological Guidelines of MoE, Fulfilling the database SEKM including an assessment of priorities, Journal of the MoE No 3, March 2011
- Methodological Guidelines of MoE, Fundamentals of working out the feasibility studies for measures for the contaminated sites, June 2007
- Methodological Guidelines of MoE, Addressing the issue of the establishment of indicators of possible oil pollution during rehabilitation of contaminated sites, Journal of the MoE No 3, March 2008

Methodological manuals

- Methodological manual on evaluation of survey and remediation, version 2011
- Methodological manual ISCO, updated in 2010
- Methodological manual of the MoE, The application of geophysical methods in the protection of water resources, 2010
- Methodological manual of the MoE, Options of the geophysical methods, 2009
- Methodological manual of the MoE, Basic principles of hydrogeology, 2010
- Methodological manual of the MoE, for use of reductive technology in situ during remediation of contaminated sites, in 2007.

2.3.7.2 Inventory of old environmental burdens

The issue of the inventory has not been systematically managed in the Czech Republic. There are number of data sources that are not compatible with each other and the process of reporting by national and international institutions is quite lengthy and complicated (not – unified format of data). Due to the lack of national coordination of data collection, the process of removing environmental hazards itself is not efficient.

In the recent years, the MoE has attempted to change this inefficiency state and to supplement the information on the POPs. The old system of registration of old environmental loads (abbreviation in Czech: SESEZ) has been transformed into the database of contaminated sites (SEKM), which serves as fully electronic system for registering contaminated sites (SEKM II) in order to provide information about specific contaminated sites, data collection, and their presentation. The database is open to the public on <http://www.sekm.cz/>.

In 2008 – 2009, first stage of the inventory was carried out by the stock company RMT VZ, Prague, „Inventory of old environmental burdens, or contaminated sites with an abundance of persistent organic pollutants (POPs)". Second phase of the inventory was completed in December 2010.

Output of the project is to create the package of materials, including information about all known sites that are contaminated or could be potentially contaminated by the POPs. The material contains information about the current state of these sites including implemented remedial measures.

Information with the basic data for all locations (coordinates, location, geology, existing conditions, assets and, where appropriate planned use, etc.) are being gradually transferred to the database SEKM II. For all sites, the priority category was evaluated according to the methodological guidelines of the MoE No 14/2008. In total, 1010 records related to POPs were updated or supplemented in the database SEKM II.

Since 2009, the project of the Czech environmental information agency (GENIA) "National inventory of contaminated sites, first stage (NIKM)", is being implemented. The project was funded from the operational programme of environment. The aim of the project is to enter into the database all the old ecological burdens (approx. 7000), respectively, contaminated and potentially contaminated sites in the Czech Republic that are mentioned in different information sources (province, regional authorities, and other sources).

In the first stage, into the unified data platform, there have been entered inventory data from the three selected areas in the Czech Republic that have been authenticated also using the methodology. Second phase will use GIS analysis of older aircraft and satellite images to search for other potentially suspicious locations and to get information about the new sites or upgrade information on existing locations.

2.3.7.3 Conclusions

Details concerning the state of the inventory and progress in disposal of PCBs are listed in Chapter 2.3.2.

Spolana Neratovice in Mělník district was identified in the original Plan as a site with significant presence of PCDDs/Fs. In 2009, remediation of this site was successfully completed, using non – combustion technology with base catalyzed destruction alkaline catalytic degradation (BCD) by the stock company BCD CZ, Prague.

The Ministry of Agriculture (MA), in cooperation with the State Phytosanitary Authority (SPA) since 1994 carries out elimination of obsolete pesticides using its own budget. Surface inspection conducted during 2008 resulted in a list of total of 212 sites and locations (stores of pesticides in agricultural enterprises and objects with possible contamination) that could potentially be contaminated with POPs.

The list was given to the MoE to include it into the first phase of the inventory of contaminated sites with POPs. During 2008, based on the information from nation wide inspections checks SPA eliminated 50776 kg of obsolete pesticides. MA has spent on the destruction of these hazardous wastes around 1 540 000 CZK.

Inventory of POPs at the MD was finished in January 2009. Based on the report, it was shown that MD is the owner of the contaminated sites with occurrence of POPs. In particular, it concern use of paints containing POPs, according to annex No 8 of Act No 185/2001 Coll., on waste. These contaminated sites are being used by the army up to present time, but are subject to the specific regime.

The issue of the presence of these pollutants were consulted with the chief health officer of the Czech Army (ACR) and basic measures had already been achieved, in particular, to adjust the frequency of training and in this way reduce exposure. The MD will begin addressing the concentrations and occurrence of POPs substances in paint on those workplaces more closely.

The issue of contaminated sites is a priority and needs to be addressed primarily. Those places are potential sources of POPs that can be released into the environment, and therefore, it is desirable in the shortest possible time systematically dispose them.

The urgency of the situation stems out of the fact that at the end of the inventory of these sites, the financial resources had not been made available for remediation of old environmental burdens caused by the POPs. There is no another procedure and it is not clear how this issue will be solved in the following period due to the obligations arising from the decisions of the Stockholm Convention and also from the EU legislation.

2.3.8 Summary of future production, use, and releases of POPs – requirements for exemptions

The 4th Conference of the Parties, held in Geneva from the 4th until 8th of May 2009, adopted new decisions to include 9 new substances in the annexes of the Stockholm Convention. In annex A, i.e. among the substances targeted for elimination from use and production, compounds or groups of compounds were newly added: α – hexachlorocyclohexane, β – hexachlorocyclohexane, chlordecone, hexabromobiphenyl, hexabromodiphenyl ether and heptabromodiphenyl ether, lindane, pentachlorobenzene, tetrabromodiphenyl ether, and pentabromodiphenyl ether. Annex B of the Convention had been newly expanded to perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride (so called compounds on the basis of PFOS). In Annex C, i.e. among the substances that are subject to the measures against their unintentional production, pentachlorobenzene was newly included.

The above mentioned changes, in the annexes of the Stockholm Convention, entered into force on the 26th of August 2010, as for the Czech Republic as for most of the parties. The 4th COP allowed the Parties to continue use of certain chemical substances, with various specific exemptions or acceptable purposes, listed in the relevant decisions; in case the Party registers the exemption at the Secretariat of the Stockholm Convention.

In compliance with the Government Regulation No 26 dated the 4th of January 2010, on the proposal to adopt amendments to the annexes of the Stockholm Convention on persistent organic pollutants, the Czech Republic registered the following specific exemption: "Products in accordance with the provision of part IV of the annex A" for tetrabromodiphenyl ether and pentabromodiphenyl ether, hexabromodiphenyl ether, and heptabromodiphenyl ether. The specific exemption was registered for perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride named "plating (hard coating) and plating (decorative plating)".

The Czech Republic also notified acceptable purposes for PFOS based compounds: "photo imaging, photo resist and anti – reflective coatings for semi – conductors, aviation hydraulic fluids, metal plating (hard metal plating) only in closed – loop systems".

Specific exemptions for the above mentioned chemical substances are registered for five years, i.e. until the 26th of August 2015. Acceptable purposes are not so strictly time limited.

On the 5th session of the Stockholm Convention's Conference of the Parties, endosulfan was included in annex A, with specific exemption for production and with list of specific exemptions for use in accordance with the provisions of the new part VI of annex A. These exemptions include 16 complexes of crops and diseases (crop – pest complexes). As endosulfan is not produced in the Czech Republic and time for its use for plant protection has already expired, it is not necessary to apply for a specific exemption.

2.3.9 Existing programmes for monitoring releases and environmental and human health impacts, including findings

One of the short – term activities stated in the first Plan was to ensure the comprehensive conception of POPs monitoring, which could interlink existing national programmes and could also use experiences from international monitoring programmes. “The conception of POPs monitoring and processing and usage of POPs data in the Czech Republic” was approved by the National council at 5th meeting in July 2008. The conception was based on conclusions coming from 1st POPs Inventory, which took place in 2005 and builds on existing monitoring programmes, their rationalization, and furthermore its goal is better usage of gained environmental data. The conception secures in the long term the fulfilment of obligations coming from the decision SC – 3/19 on Global monitoring plan within Stockholm convention. Therefore the conception covers monitoring of air, breast milk and because of newly listed substances the conception covers also monitoring of water and sediments. The system of POPs monitoring in the Czech Republic fulfils requests adopted at COP4 and COP5 (in 2009 and 2011) according to which are POPs monitored in two basic matrices air and breast milk and insert monitoring of water for hydrophilic substances, as is stated in decisions SC – 4/31 and SC – 5/18.

2.3.9.1 Existing Programmes for Monitoring

The Czech Republic is one of a few European countries, which has long term POPs monitoring in air. Since 1988 POPs in air are monitored at the Košetice CHMI station. This station is considered as background station for middle Europe and it is the only one in Europe, where POPs are monitored not only in air, but also in a wet atmospheric deposition, surface water, sediments, soils, moss and needles. It is then POPs integrated monitoring carried out by CHMI in cooperation with National Centre for POPs. POPs are monitored in the air by passive sampling. The Czech Republic is the only one country, where this instrument is broadly used since 2004. Sampling network named “MONET_CZ” (MONitoring NETwork) is unique by its scope, which enables evaluation of effectiveness of measures approved in sources to POPs emission reduction. The network was proposed in 2004 and it was successfully tested till 2006. Outputs of MONET_CZ serve not only to monitoring of changes in time and spatial data, but also to identification and characterization of their sources. Data are also used for better understanding of environmental influences of particular primary and secondary sources and for detection of contaminants transport in particular region and among them. Sampling network MONET_CZ is unique also by its scope (37 localities), which enables evaluation of effectiveness of measures approved for reduction of POPs emission from different types of sources. Data from MONET are the base for national inventory in given calendar year.

The Czech network MONET_CZ serves as a model for building of similar instruments in other countries and UN regions, especially where no data about air quality are available (for example middle and east region of Europe (MONET_GEE) and Africa (MONET_Africa)).

In accordance with requirements coming from Directive 2000/60/EC of the European Parliament and of the Council of the 23rd of October 2000 establishing a framework for Community action in the field of water policy has been provided monitoring of surface water and groundwater. The programmes of monitoring for surface water and groundwater were conditionally approved in accordance with requirements of framework for Community action in the field of water policy on the 19th of December 2006 and testing of situational monitoring took place in 2006. Every other programmes of monitoring were officially started till the 22nd of December 2006; more information in relevant form can be found on the website www.ochranavod.cz.

The programme of chemical monitoring of surface water includes also POPs to the extent of the registration of their usage in the Czech Republic, eventually with regard to their former usage permits. According to these mentioned reasons, substances (chlordane, mirex, chlordecone, hexabromobiphenyl) are not included in these programmes.

The monitoring conception has been extended to sampling areas for water monitoring in 2010, especially for chemicals, which are of hydrophilic nature (as for PFOS).

POPs are monitored within the System of monitoring the environmental impact on population health of the Czech Republic in air in urban stations (PAHs), in drinking water, dietary exposure, breast milk and blood serum.

Monitoring of breast milk and blood is systematically ongoing since 1994 within System of monitoring the environmental impact on population health of the Czech Republic, which is granted by the NIPH. Within this population health monitoring are POPs monitored in air, food supply, breast milk, blood and blood serum. At EU level is ongoing effort to synchronize all monitoring activities, in which is involved NIPH from the Czech Republic. Within MZ resort are monitored and evaluated the direct POPs exposition inputs (diet, drinking tap water, partially air), and also the concentrations in fat part of bodily fluid (breast milk and blood serum) and tissues, as reflection of total human burdens from the environment.

Transversally POPs are monitored by System of monitoring the environmental impact on population health of the Czech Republic in 1) air in urban stations, where the concentrations of PAHs are measured; 2) within national monitoring public supply by drinking water. The results are presented annually in the drinking water quality report published on the website of NIPH; 3) monitoring of dietary exposure, which monitors exposure POPs dose of Czech Republic, on the basis of food supply, and it is evaluated from the point of drawing acceptable or tolerable exposure limits. The results are presented every two years on NIPH website. 4) Total human burdens by POPs are monitored regularly within the breast milk and blood serum biomonitoring. After ten years measurements in four localities (towns), biomonitoring continued in new chosen towns (Praha, Ostrava, Liberec, Uherské Hradiště, and Kroměříž). Results are presented on website of NIPH within Centre of environmental hygiene section. Time series are formed for all matrices, which allow trends evaluation since half of the 1990s. 5) Since 1970, Retrospective POPs monitoring in united samples of blood sera from selected localities, in order to determine long term time series. The screening of PAHs concentrations was provided in surface water in 35 cities of the Czech Republic between 2002 and 2005.

An integral part of monitoring activities is also the inventory of old burdens contaminated or potentially contaminated by POPs. 1st stage was finalized in 2009, 2nd stage began in the second half of 2010. An overview of the contaminated sites will be published in Inventory system for contaminated sites (SEKM), in which data about old environmental burdens are registered and updated. More detailed information can be found in the chapter 2.3.7 above.

2.3.9.2 Processing and Management of Monitoring Data

One of the goals of the POPs monitoring conception and processing and usage of data in the Czech Republic is data visualization, to make them available to expert and non – expert public, but also to use them for creations of new legislative and non – legislative measures at national, European and global levels.

In order to comprehensive use of data from monitoring programmes, the Czech Republic sets up an expert system GENASIS (The Global Environmental Assessment and Information System) via National Centre. This system represents new generation of multidimensional software for expert analysis, simultaneous visualization and processing of different kinds of environmental data and data from different sources.

GENASIS covers not only environmental matrices of Stockholm convention, but also aim to complex mapping of environmental conditions (air, soil, water, biota, human tissues) and connecting information obtained from expertise and validate data from partner institutions. Further interconnection with Integrated Pollution Register (IPR) (chemicals releasing to the environmental compartments from industrial sources, and transport in wastes) is expected and the interconnection with SEKM is finalized.

GENASIS enables also use, display and evaluate all available information regarding, production, usage, stocks, import and export of substances, covered by the Convention, which were reported to National inventory of POPs, since 2003 including. At the same time it maps technical infrastructure for POPs evaluation, POPs measurements and research, including monitoring programmes of their releasing into the environment, their environmental and health impacts.

GENASIS enables modelling of POPs transport through environmental compartments in order to determine more specific description of their transport and mutual interactions and serves as the base for decision – making and managing authorities.

Since 2010, GENASIS is part of a single environmental information system of the Czech Republic (JISŽP) and its tools are prepared to be used for fulfilment of the commitments arising out of the Stockholm convention ratification and of priorities of the National environmental policy.

2.3.9.3 Use of monitoring data

Data derived from monitoring network are used at the national level, but also for regional and global POPs evaluation, as it is stated in the decisions SC – 4/31 and SC – 5/18 with respect to the effectiveness evaluation of SC measures.

The monitoring conception of POPs and processing and usage of POPs data in the Czech Republic uses GENASIS as the main national information system. GENASIS serves as data depository from long and short term monitoring programmes; data are accompanied by superstructure, which enables their visualization,

analysis and interpretation. Accordingly, it provides reporting from regular environmental programmes. The compartment of GENASIS is a learning part, which contains methodical and information materials for expert and non – expert public – case studies, scientific articles, research reports, monitoring methodology etc. Next goal is the use of monitoring data as a basis for creations of new legislative and non – legislative measures at national, European and global level.

At the national level, GENASIS is used for the output publications of annual changes of concentrations of chemicals studied in different environmental compartment in form of national inventory and understandable presentation of data from national monitoring network MONET_CZ, which enable monitoring of spatial trends, characterizing different types of sources and effectiveness of local, regional and national measurements.

Monitoring data acquired in the Czech Republic are at the same time the source of information for the European monitoring and evaluation programme (EMEP), which is a scientifically based and policy driven programme under the Convention on Long – range Transboundary Air Pollution (CLRTAP) for international co – operation to solve transboundary air pollution problems. Similarly the data are used for reporting on the European and national legislations (for example regulation (EC) No 850/2004). Data from breast milk biomonitoring are used for reporting to monitoring programme of World Health Organisation (WHO).

Within the framework of international cooperation, GENASIS provides global information support for SC implementation, especially for the effectiveness evaluation of the adopted conception and strategy of the Global monitoring plan and the visualization of outputs. The interconnection with international data sources creates a further potential for global spatial evaluation of anthropogenic influence on the environment and ecological and health risks associated to them and provide the information about dynamic development of environmental conditions and quality. GENASIS outputs can find applications within global monitoring programmes, for implementation of multilateral treaties concerning chemical management as basis for particular secretariats of conventions and in an environmentally – oriented EU and UN institutions.

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

The Czech Republic belongs to very active countries, with respect to POPs monitoring in environmental compartments, and to research and to environmental friendly elimination of POPs, including searching of new technologies. The Czech Republic has a lot of data available from different sources, and makes effort to make them available to current management, researches and to public through the information system GENASIS (see chapters 2.3.9.2 and 2.3.9.3). Unfortunately, available information is just marginally taken up by administration.

The Czech Republic hosted Regional Centre for Capacity Building and the Transfer of Technology in the Central and Eastern Europe. The centre is located in Brno within National Centre for POPs and provides an expert assistance not only in Europe, but also to a number of African and Asian countries. It provides training in the area of POPs, consultations and help in the development of national plans, building monitoring networks in countries of the region and also provides expert and laboratory capacities for determination of levels of environmental pollution in different countries. The Centre provides also technology transport and know – how in the science, research, levels of management, and also applications which are directly used for the environment protection.

The regular summer schools of POPs belong to the most appreciated educational and information activities of the Czech Republic determined to other countries. The Czech Republic builds and supports in the long term the monitoring networks in the middle and Eastern Europe (MONET CEE) and in Africa (MONET Africa), which enables obtaining the information about POPs occurrences in air of these countries. Within many bilateral projects of external development co – operations, Czech experts helped to build national capacities for next work e.g. determination of POPs level pollutions or implementation of POPs elimination technology (e.g. in Serbia, Moldavia, FYROM, Vietnam and other countries).

It is important to more focus on increasing of public awareness. Actions as chemical fairs, art competitions, and/or targeted information campaigns regarding particular chemicals and their management could serve as examples to follow. As an example can be mentioned national art competitions held to 10th anniversary of SC signature organised by MoE in cooperation with National Centre. There were launched a special website including information about the Stockholm convention. The tasks regarding public awareness are stated within the activities No 3.9. and 3.10. in recent Plan.

2.3.11 Relevant activities of non – governmental stakeholders

There exist many non – governmental organizations in the Czech Republic, which are oriented on the Environment protection. They are members of a registered association Green circle which connects 28 ecological NGOs. The main objectives of the association are:

The development of civil society in the environmental protection area

The strengthening of the cooperation and the communication of NGOs

The engaging the public in the creation and the implementation of environmental policy

The increasing of public awareness about NGOs activities and actual problems of the environment protection

Since 2002, the Green circle ensures also organisational background for related platform – open information network for the Green circle members and other 78 organizations (www.zelenykruh.cz).

Regarding SC, it is important to note the activities of the association Arnika, NGO which is since 2001 the coordination centre for working group on dioxins, PCBs and wastes within international network IPEN (International POPs Elimination Network) associated more than 700 NGOs from around the world.

Main Arnika activities are related to the reduction of environmental pollution with toxic substances and wastes, wetlands protection and watercourses and the support of public participation in environmental decision – making. The important role represents also the cooperations with other NGOs at national level and its involvement in activities at global level. Arnika coordinates the European group on dioxins, PCBs and wastes within IPEN and it is member of the international coalition Health Care without Harm.

NGOs activities concerning the Stockholm convention

These activities are concerned on the environmental pollution of the Czech Republic by toxic substances, e.g. dioxins, PCBs and heavy metals. A number of these substances enter the environment from wastes and processing. Arnika through information campaigns draw attention to the problems and makes an effort to more strict law and the implementation of so called "cleaner production" or consistent recycling of wastes. The part of these activities is also the enforcement of citizens' rights to information about toxic compounds in the Environment, which is still not matter of course in the Czech Republic.

The programme Toxic compounds and wastes should be mentioned especially, this programme focuses on two areas of interests since 2001:

- Consistent SC implementation and reduction of POPs releasing in the Czech Republic
- The preservation of free access to the information about toxic compounds in Integrated Pollution Register (IPR).

The goal is reducing of presence of toxic compounds in the environment. Through the campaigns, Arnika devotes to the concrete problems of environmental pollution by toxic compounds e.g. from waste deposits and waste combustions.

An overview of the realized or ongoing campaigns within the programme toxic compounds and wastes:

Future without toxins (since 2001) – the goal is to enforce continuous reduction of health and environmental toxic compounds. It seeks to achieve this through the Integrated Pollution Register (IPR) and a consistent implementation of the Stockholm Convention and EU chemical policy (REACH regulation). It makes effort to reduce the environmental burden by toxic compounds from concrete sources so called hot spots, which are both working factories and unsolved old environmental burdens.

Don't play with PVC (2007 – 2009) – The reduction of PVC use and therefore the contribution to reduction of dioxin formation and releasing. The campaign was focused on toys and items for children, health care and wrappers for foodstuff

Health care without PVC (2001 – 2007)

Health planet for health children – campaign focused on the theme of sustainable consumption and production, target group are mothers and children

Waste is raw material (new project) – brings examples of good waste policy from the Czech Republic and foreign countries, focused on communal wastes. Target groups are villages, cities, regions and individuals.

Clearer air for Ostrava region (since 2009) – public education and focus on the activities of competent authorities with regard to the issue of the great amount of pollution sources located in small area.

Burning thoughtfully – campaign – we burning regardful of nature and neighbours or else the furnace is not scrape basket, focused on prevention of dioxin formation

Save paperwork – campaign points out to unnecessarily high consumption of paper, supports buying of products from recycled paper and support paper recycling as it is a valuable raw material

Websites about dioxins and other toxic compounds (www.dioxin.cz)

List of publications issued in the Toxic Compounds and Wastes programme (2005 – 2011)

Czech versions only:

- Lindane – pesticide for black list
- Pexeso – our school without toxin
- Delightful ignorance of bisphenol A – complex overview of existing scientific finding about bisphenol A, which is added to plastic consumer articles
- Domestic guide on toxic galaxy
- Generation at risk, Reproductive Health and the Environment (Schettler, Solomon, Valenti, Huddle, 2008) Czech translation: Generace v ohrožení – Reprtoxické látky v životním prostředí
- The incineration plant for municipal waste in Liberec – important source of POPs – updated version of the original publication from 2006
- POPs in the Environment of the Czech Republic – map (the occurrence, sources of releases and the concentrations of POPs in different environmental compartments (in soils, domestic eggs, water, breast milk, human blood, fish and in water sediments)
- Overview of problems of former pesticide warehouse in Klatovy – Lub (2007)
- REACH – what happened and why? – Subtitle of the Guide of the only Planet on secrets of EU chemical policy
- Non – combustion technology for the health care waste management

English versions:

- Chlorine Production – a Large Source of Mercury Releases (information on two installations producing chlorine in the Czech Republic and on emissions and releases of mercury into the environment)
- Spolchemie: A case study for Unintentional Production of Hexachlorobenzene

2.3.12 Overview of technical infrastructure for POPs assessment, measurement, analysis, management, research and development – linkage to international programmes and projects

2.3.12.1 Monitoring

In line with the principles of the most effective use of resources, monitoring networks in the Czech Republic are used to both national and international purposes to monitor POPs in atmosphere. The European monitoring and evaluation programme, EMEP and the Integrated Atmospheric Deposition Network (IADN) are most significant given the scope and time of measurement. The only station equipped with active sampling of POPs in the central and eastern Europe is Košetice station (N49°35'; E15°02'; Figure 5 locality 1), background observatory of the CHMI. This locality also bears world unique continuous programme of integrated monitoring operated by Masaryk University in Brno in cooperation with CHMI since 1988. The station is also involved in EMEP, but in addition regular monitoring of environment compartments such as air, wet atmospheric deposition, surface waters, sediments, soils and biota. Košetice data are part of the MONET networks (monitoring networks) such as MONET_CZ, MONET_CEE and MONET_Europe that are supported and operated by the National Centre for persistent organic pollutants and by the Stockholm Convention Regional Centre located in Masaryk University, Brno. MONETs feed their data also into the Stockholm Convention Global monitoring plan.

2.3.12.2 POPs research in the Czech Republic

A plethora of research and other projects on POPs has been carried in the Czech Republic by a number of national and international institutions – ministries, grant agencies, national institutes but also UNEP, UNIDO projects as well as those financed/supported by the EU. A selection of important research projects running nationally and internationally is provided below:

INCHEMBIOL (2005 – 2011) – Interaction among chemicals, environment and biological systems and effects at the global, regional and national level, research area, supported by the MEYES

Research intention is based on searching of the interactions among chemicals, which are presented in environmental compartments and their biological effects: survey of POPs fate particularly in the environment and their impacts on environment and on living organisms, including humans. The fate is represent in this context by total of transport processes (starting with their inputs to the environment, their transport in the environmental compartment, to which they primarily entered, transport among compartments and long way transport through environment) and transformational processes (abiotic and biotic transformation), this requires the study of distributional equilibrium, properties condition their behaviour in the environment, the study of development of transformational reactions and their products.

CETOCOEN (2010 – 2013) – project of The European Structural Funds, OP VaVpl

The goal of this project from Operational program “Research and Development for Innovation” is building of Research Centre for Toxic Compounds in the Environment as Regional centre of applied research. Project CETOCOEN applies scientific and research knowledge of basic research into the evaluation of impacts of industrial activities on environment and public health. Within Europe, the range of registers and databases exists, which informs about environmental conditions, presence of chemicals in air and surface waters, or about increase of health problems in particular state and region. There is no system, which could be able to interconnect these data and could allow searching the reasons of negative environmental impact on human health.

ArcRisk (2009 – 2013) – Arctic Health Risks: Impacts on health in the Arctic and Europe owing to climate – induced changes in contaminant cycling. Project supported by the EU 7th Framework Programme (for research and development)

Arctic studies provide a rich source of information, which can be used for the comparison of situations in different parts of Europe, with respect to recent and future climate changes. within selected climatic scenarios, the project will provide new information about chemical properties and environmental behaviour of typical contaminants under arctic conditions, results of models describing the transport of contaminants from source region to Arctic area and their fate, including inputs of these chemicals to food chain and comparison of the information from arctic health studies with results of studies devoted to public contamination effects in selected European regions.

AquaRehab (2009 – 2013) – Development of rehabilitation technologies and approaches for multipressed degraded waters and the integration of their impact on river basins management. Project supported by the EU 7th Framework Programme (for research and development).

The project works toward innovation and rehabilitation soil, underwater and surface water technologies, which enable to reduce the amounts of priority contaminants (nitrates, pesticides, chlorinated, aromatic compounds and others). The project will introduce the connection between innovation technologies and management at the level of river basin areas.

isoSoil (2010 – 2011) – Contaminant – specific isotope analyse as sharp environmental forensics tool for site characterisation, monitoring and source apportionment of pollutants in soil. Project supported by the EU 7th Framework Programme (for research and development).

Contaminant – specific isotope analyse (CSIA) is a tool, which usage exponentially increases in the last time. It can be used as a complement to conventional analysis of concentrations, during identification of pollution sources, and to monitoring of development and quantification of effectiveness of contaminated sites remediation. CSIA application reduces the price of the characterization and monitoring of contaminated sites, while dramatically increases the precision of the determination.

Monitoring

MonAirNet (2010 – 2012) – Strengthening the Austrian – Czech Republic cross – border cooperation: Impact assessment of POPs in the atmosphere. Project is supported by the programme „European territorial cooperation Austria Czech Republic 2007 – 2013“

Main objective of this project is strengthening the Austrian – Czech Republic cross – border cooperation in the area of evaluation of air burden by POPs in these regions. It will be established common monitoring network with one year monitoring programme within the projects realization. Accordingly first time in the history, the analogue data will be obtained about the POPs levels in the air in these regions, and this network can be interconnect with already existing large monitoring networks (EMEP, MONARPOP, MONET). Rising of public awareness and results publishing can serve to better public knowledge and cooperation strengthening between regions.

ENVISCREEN (2008 – 2011) – New molecular bioscientific and biochemical methods for estrogens and other endocrine disrupting chemicals monitoring, Project NPV2

The research project will bring introducing, optimization and validation of unique combinations of modern (and in the Czech Republic unique) bioanalytic and toxicologic techniques for evaluation of endocrine disruption potential of different types of environmental samples. Using of these methods will provide new information about the occurrence and the levels of priority contaminants, which disturb natural hormonally regulated functions in living organisms (endocrine disruptors, especially estrogens and their derivatives, other steroids, pesticides and persistent substances, alkylphenols etc.) in different environmental compartments of the Czech Republic.

SciPOPsCTR (2007 – 2011) – Realization of scientific research objectives of SC National implementation plan, Project VaV MoE

This project is related to the complex basic research of sources, occurrence, transport and transformation, mechanisms of effects, evaluation of health risk and risk for wildlife, which is connected with occurrence of monitored substances in the Czech Republic with a view of direct practical coherence with activities of UN and EU experts' teams. Projekt SciPOPs is related also to the realization of scientific research within SC National implementation plan; to the international scientific cooperation and to the education of young experts in the field of persistent, toxic substances.

AirToxPM (2007 – 2011) – Complexed characterization of dust particles in air, Project VaV, MoE

The main objective of this project is systematically characterized physical, chemical, and toxicological properties of dust particles with help of the most suitable combination of modern methods including the research and identification of their primary source, characterization of the sorption potential, including behaviour modelling, studies of their further fate and their persistence in atmosphere and toxicological effects.

The consequences of POPs photochemical activities in polar areas (2010 – 2013) – GACR project

The project proposal includes the research in the fields of photochemistry of organic pollutants in snow and ice that means research of photoprocesses, which can take place in polar areas and on ice particles in atmosphere. It is approved, in the recent time, that snow and ice can be natural media for photochemical transformation of organic compounds, but comprehensive model describing these processes is missing.

The project proposal involves experimental studies of selected photoreactions under simulating conditions, which correspond to the environment of middle arctic area irradiated by sun radiation; at the same time also mechanistic (timely differentiated) study, which will lead to the explanation of detailed photochemical behaviour of natural organic snow additives. It will be possible, based on experimental evidences to formulate general principles and to determine life time of these substances under cryogenic conditions. One of the concrete tasks of this project will be to study the phototransformation of petroleum substances in connection with the pollution around oil wells and refineries in snowy areas.

POPs bioaccumulation in earthworms with relation to their bioavailability in soil, (2010 – 2013) – GACR project

The POPs presence in soil is connected with threats to soil organisms, plants and all terrestrial ecosystems. The key role plays the POPs bioavailability in soil, because only bioavailable fraction of POPs can be accepted by organisms, cause the toxicity or enter the food chains. Within this project factors and processes influencing bioavailability of selected POPs (PAHs, PCBs, HCH, and DDT) for worms in soils, POPs properties and their anging are studied.

Determination of range of biological effects of atmospheric pollutants in vitro (2009 – 2012) – GACR project

The proposed project will evaluate wide range of biological effects in vitro. The study will describe cytotoxicity, genotoxicity, dioxine – like toxicity, estrogenity and androgenity of pollutants mixures present in gase phase of air and in six breathable size fractions of aerial aerosol. The samples will be collected in selected localities, which differ by the extent and type of pollution. Detailed summaries of seasonal variability and distribution of biologically active substances within and among fractions together with data from chemical analysis will provide unique information, which can serve for significant improvement of environmental risks evaluation.

RECETOX Networking (2011 – 2014) – Support of experts and global networking in the fields of environmental research in the Czech Republic, project the European social fund and budget of the Czech Republic

Project supported by the European Social Fund (Programme Education for Competitiveness)

The project addresses the support to national networking and career progress of academic professionals and doktorands in this top workplace (Research Centre for Toxic Compounds in the Environment, Faculty of Science, Masaryk University) in cross – sectional field of studies.

MONET_Africa (2010 – 2012) – Long – term monitoring of POPs in atmosphere in Africa, project supported by the EU funding

Project addresses a long term POPs monitoring in air by passive samplers. A special attention is paid to newly listed chemicals in the Stockholm Convention on POPs.

2.3.12.3 Capacity and facilities for POPs destruction/removal in the Czech Republic

Upon formulation of the first NIP, the Czech Republic did not have sufficient technology available for removal of obsolete PCBs and OCPs, wastes contaminated by POPs (in particular by PCBs) and contaminated soils and sediments. To remove part of the POPs containing waste a co – incineration in the incineration plant in Ostrava (company SPOVO) could be used.

Nevertheless, technological solutions were identified and the Czech Republic thus can use the following technologies:

Base Catalysed Decomposition (BCD technology) used in the project “Dioxiny”, Spolana Neratovice by the BCD CZ Ltd., supported by the national budget. MoE of the Czech Republic, in particular Department of the Ecological Damage functioned as supervisor of the project. Further use of this technology in the Czech Republic is currently discussed.

Development of technology is under way within the project of MoE SP/2f3/133/08, titled “Research of removal of persistent organic pollutants from a solid matrix by thermal desorption technology”. The goal of this project was the verification of thermal desorption technology or biodegradation of POPs in soil tare or mixed construction and demolition wastes, the verification of effectiveness of the technology by objective methods (BAT/BEP) and the optimization of technological processes in the pilot plan unit (in 2010). The solution is comprised of five stages in period from March 2008 to December 2010.

MIT supports via new announced programmes of support of science and research BAT technologies for example in the programme “Permanent prosperity II” and others. MIT prepared 22 support programmes within new Operacionale programme business and innovation for the 2007 – 2013 periods. Business support will particularly focus in the 2007 – 2013 programming period on enhancing its competitiveness via innovation and practise take – up of the research results.

2.3.13 Identification of impacted environments or populations (including workers and local communities), estimated scale and magnitude of threats to public health and environmental quality

2.3.13.1 POPs occurrence in the environment of the Czech Republic

POPs in the atmosphere of the Czech Republic

Czech Republic is one of few European countries with a long term POPs monitoring in atmosphere. Košetice station (N49°35'; E15°02'; Figure 3 locality 8) is the only station for POPs monitoring with active sampling of air in the Central and Eastern Europe. This background observatory of the Czech Hydrometeorological Institute (CHMI) also bears a world unique continuous programme of integrated monitoring operated by the RECETOX, Masaryk University in Brno in cooperation with CHMI since 1988.

The station is also involved in EMEP, but in addition regular monitoring of environment compartments such as air, wet atmospheric deposition, surface waters, sediments, soils and biota. Košetice station serves as background station for the central and eastern Europe in the framework of the EMEP programme and Global monitoring plan of the Stockholm Convention). Chemicals analyzed in relation to POPs are all Stockholm Convention POPs, in particular organochlorinated pesticides (DDT, HCHs, HCB), and 16 priority PAHs according to the US EPA.

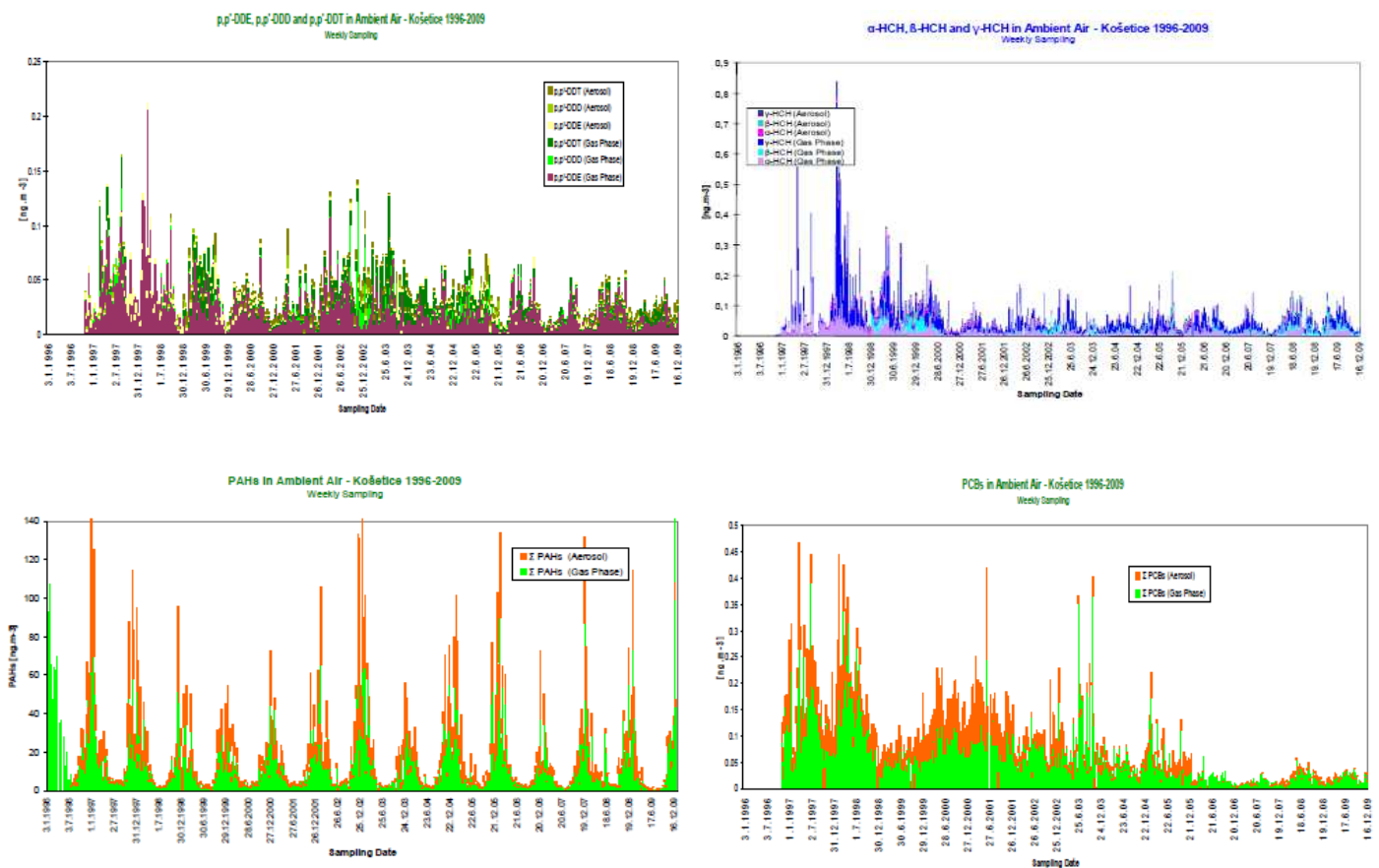
Such a long and extensive monitoring programme gives enough data for the evaluation of seasonal variation and long – term trends in atmospheric concentrations of POPs. Levels of PAHs show characteristic behavior, for which dominate high concentrations of these substances during the winter, when they are emitted because of combustion trials. The highest level recorded in January and February are more than the order higher than the lowest values detected in July and August.

On the other side the profile of atmospheric concentrations of PCBs and OCPs look differently. The most of these substances are prohibited in Europe and their primary sources are eliminated. Seasonal atmospheric concentration maxima originate not from the production or the seasonal application, but they are caused by higher volatility of these semivolatile compounds from old environmental loads (contaminated soils, sediments or wastes) during the most warm period of the year, or their atmospheric long – distance transport from countries, where are still used.

In the agreement with this hypothesis the highest concentrations of semivolatile organochlorinated compounds are measured during the summer, when high temperatures increase their volatilization. Even if this seasonal fluctuation is weaker than in case of PAHs, it is still noticeable for PCBs and pesticides as it is mentioned in Figure 1.

The annual medians of atmospheric concentrations were counted for each group of substances (PAHs, PCBs, DDT, HCHs a HCB) and final values were used for the long – term identifications as can be seen in Figure 2. While atmospheric concentrations of PAHs were in the last years relatively stable, PCBs showed in the long term the declining trend. The greatest variation was detected for pesticides, which showed significant increases of concentrations in period after devastating floods at the turn of the Millennium (1997 and 2002).

Figure 1 Seasonal variation in concentrations of PAHs, PCBs, DDTs a HCHs in air, Košice, 1996 – 2009



Between 2007 and 2011, the project MONET_REGION took place in cooperation with the National Centre and district offices in all 14 districts of the Czech Republic in order to monitor specific issues of the particular region. The sampling area can be seen in Figure 3. The study targeted the influence of different primary and secondary sources of pollution and the quality of the surrounding environment. The most important sources of POPs (chemical industry, refinery, cement plants, incinerators of communal, medical and hazardous wastes, waste disposal and remediation units) were put in this study together with their direct and distant surroundings. The following conclusions could be drawn:

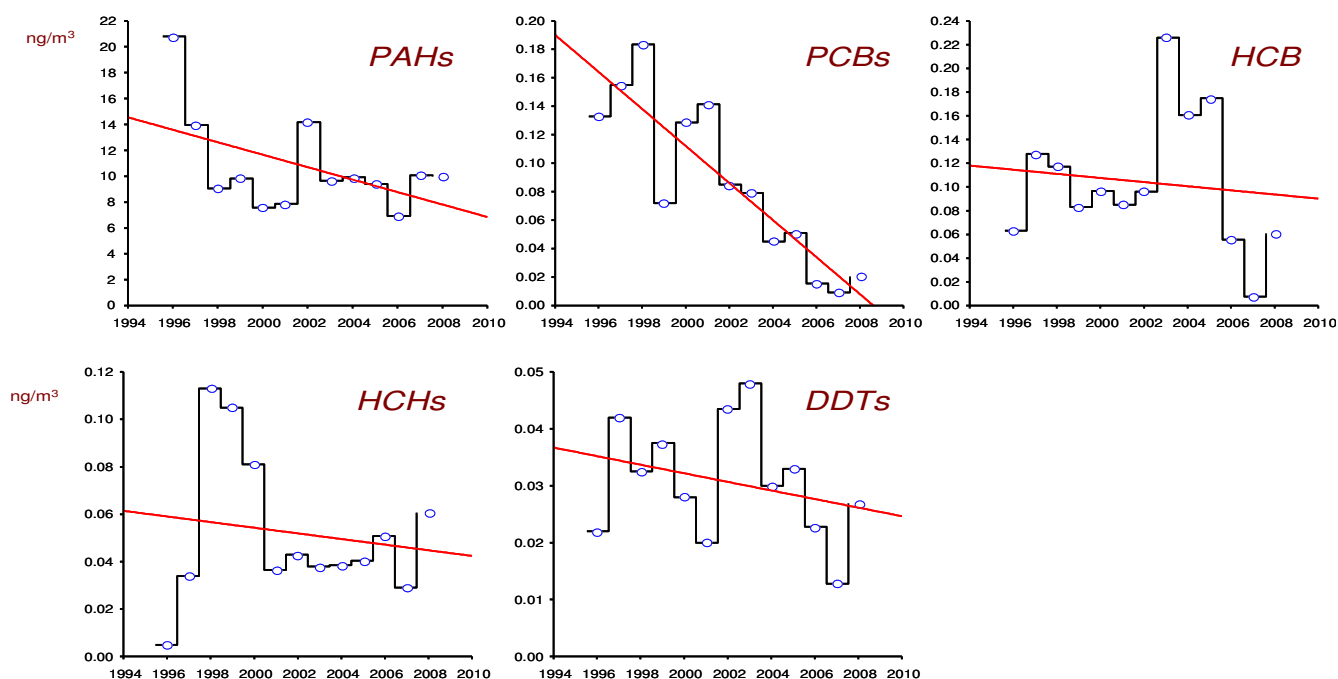
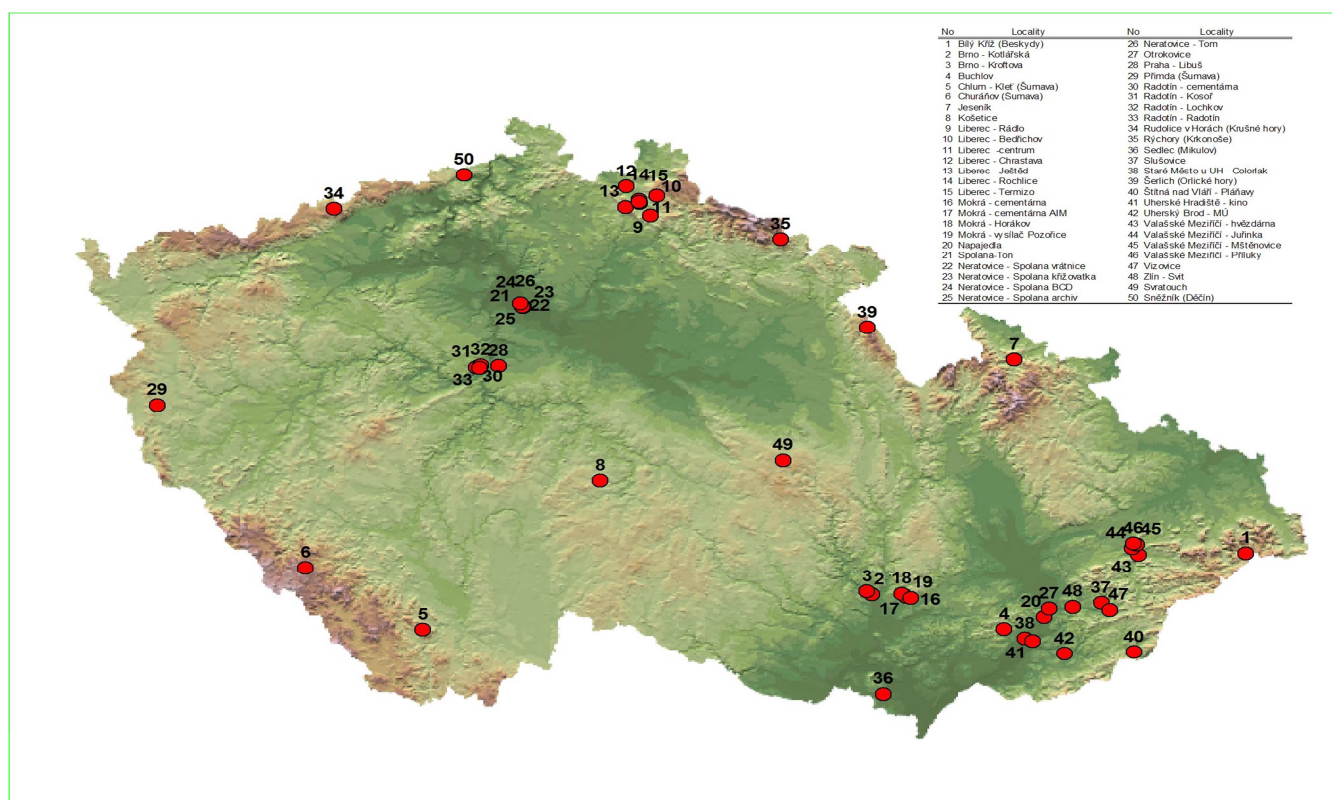
The concentrations of organochlorinated substances show typical seasonal variation with higher values in the summer and lower values in the winter, because as the main source of these substances in atmosphere is their volatilization from primary and secondary sources (contaminated soils or buildings), the concentrations of the substances arise with increasing temperature.

Higher levels of PCBs were identified in the surroundings of old burdens (localities with soils or buildings historically contaminated in the past time, when PCBs were used, for example for the production of paints, in the chemical industry), but also in the centres of larger towns (sources of diffuse pollution: buildings, paints, transformers, processes of combustion).

The most noticeable seasonal trends with summer maxima were determined for DDT; accordingly the highest levels were often detected in rural localities. The levels in the municipal localities were lower, especially during the summer time. The concentrations of DDE as product of DDT degradation were in most of sites significantly higher than the concentrations of original DDT, this indicates the age of contamination.

In the long term the highest median concentrations of DDT and its metabolites were detected in atmosphere quite randomly, in several rural localities with unknown sources of contamination (Konětopy in the middle and Ražice in the south of Bohemia, the castle Buchlov in Zlín district), as can be seen in Figure 4.

It can be supposed previous extensive application (castle) or illegal deposition of this pesticide nearby sampling localities. In general higher concentrations are in agricultural areas of South Moravia and in surroundings of dump sites.

Figure 2 Long term trends in concentrations of PAHs, PCBs, HCB, HCHs and DDTs.

Figure 3 Sampling stations for the national monitoring network (MONET_CZ), POPs contamination of air, pilot stage


In contrary, atmospheric concentrations of PAHs showed typical seasonal variation with higher winter values, caused by seasonal combustion. The highest seasonal differences are apparent in background localities. Suburban and rural residential areas with solid fuels combustion had often worse quality of air than city centres of larger towns. In case of PAHs we can find long term higher median values in surroundings from industrial facilities (metallurgical industry, refineries, combustion facilities, cementeries), but also close to traffic frequent intersections, arterial roads and in municipalities with residential solid fuel heating.

HCB and PeCB can originate from old burdens, and also from combustion processes, therefore their seasonal behaviors is changing in particular localities.

Volatile organochlorinated pesticides such as HCHs or HCB are very mobile in the atmosphere. The levels/concentration values of their occurrence do not differ significantly among various sampling localities. Median values of the HCHs are higher for the agriculturally impacted localities of the South Bohemia and Pilsen regions and in the vicinity of old environmental burdens (the former production or storage of pesticides).

In addition, HCB levels are higher at the old burden sites (Neratovice) and industrial sites (Ústí nad Labem) as well as in localities impacted by the agriculture (storage, disposal sites, (former) use of pesticides) such as Prostějov, agricultural localities of the Zlín and South Moravia regions. Similar distribution of atmospheric concentration levels has been observed for PeCB.

Figure 4 shows DDT concentration levels in similar sites (types). Each colourful bar provides a concentration of the DDT from a sample collected in a 28 – day sampling period. Map description contains a crosscalculation of the height of the bar to the measured value. There are 13 samples collected per year. Should there be a missing bar at any of the sites; it means it was not sampled in a particular period.

DDT and its metabolites provided the highest background concentration levels at the Děčínský Sněžník (mountain) and Pláňavy (Figure 4 top left part), other mountain sites are lower; higher concentrations were observed in the north east of the country rather than at the south west.

Taking into account rural and urban backgrounds, concentration comparable to Děčínský Sněžník were observed in South Moravia – in Sedlec and East Bohemia – Svatouch (Figure 4 top right). Higher levels were observed in order of magnitude at some urban sites, such as Konětopy in Central Bohemia or in Ražice in South Bohemia (Figure 4 middle on the left).

Contamination screened in agriculturally used land is also confirmed by high DDT levels in rural residential areas (Figure 4, middle right). Figure 4 bottom left part shows that the highest measured levels of the DDT were observed in the East of the country – Moravia. Industrial sources are not too relevant in this regard (excluding the former sources and hot spots resulting from the former pesticide production), nevertheless higher DDT levels were detected in a number of urban agglomerations; it is most likely due to the wide spread use in the past.

POPs occurrence in the water system/hydrosphere of the Czech Republic

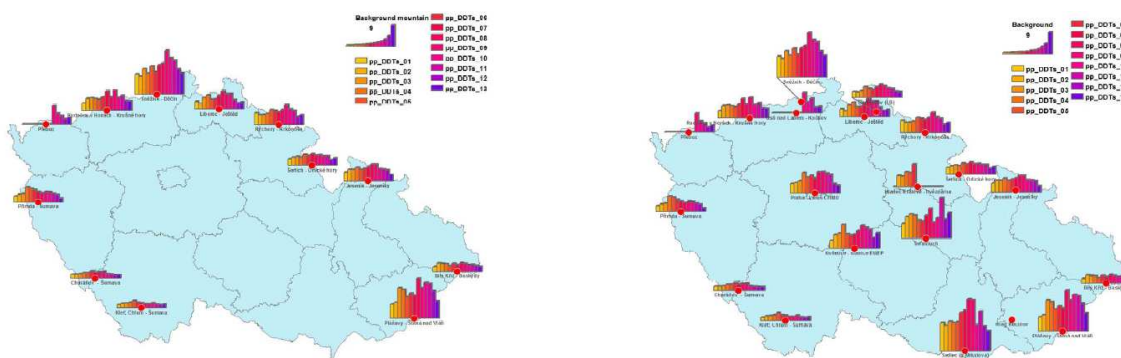
National Inventory on persistent organic pollutants (POPs) from the period 2006 – 2010 involve the information about available measurements of POPs in hydrosphere of the Czech Republic in surface water, silts, river sediments, tissues and biomaterials. As for determination of these substances, it was paid close attention to organochlorinated pesticides (DDTs, HCB, HCHs), PCBs, PCDDs/Fs and PAHs.

The obtained information indicates, that the contamination by organochlorinated pesticides (polychlorinated cyclodiens (aldrin, dieldrin, endrin and isodrin), α – endosulfan, heptachlor, methoxychlor, alachlor and trifluralin) is not a serious ecological problem in national benchmark and the vast majority of findings is being in relatively lower concentrations levels. The concentrations of these pesticides in river sediments and fish tissues appear in the scope at the most of $\mu\text{g}/\text{kg}$ units and often these substances are not proven at the level of detection of the analytical method (one – tenth $\mu\text{g}/\text{kg}$ depending on particular substance). Higher concentrations of these substances were detected in some industrial areas of chemical plants or dump sites belonging to them.

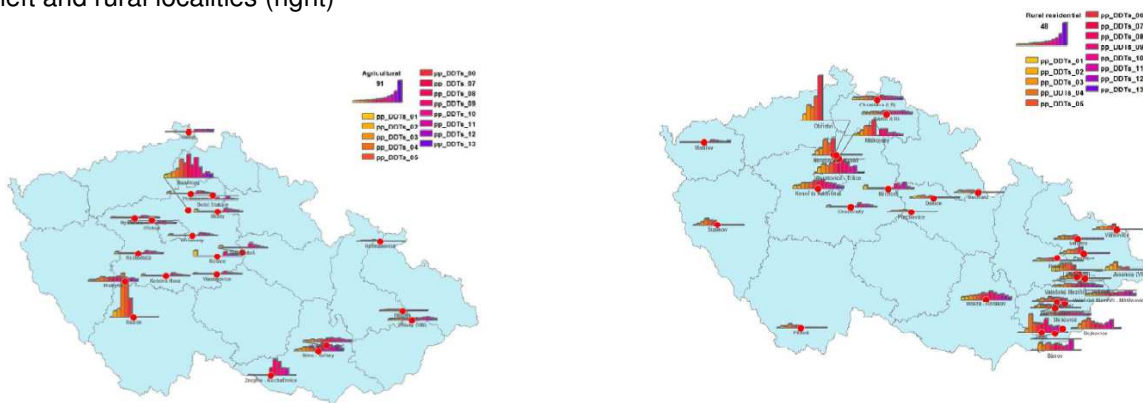
The situation is rather serious in national benchmark in the case of DDT and its metabolites and HCH isomers. These substances used to be produced in several sites, processed and plentifully used in agriculture. Similarly as in case of PCBs also in case of DDT and HCH it were found their extremely higher concentrations in the locality of chemical plant Synthesia Pardubice – Laguna. It is unusual serious source of contamination with negative risk for adjacent water features, particularly the river Elbe. Also waste and leachate waters in the localities of HCHZ – Chemie Hrušov Ltd. and Diamo Ostrava contain higher concentrations of these substances and therefore can make worse the quality of water ecosystems in their surroundings.

Figure 4 DDT levels in the air of the Czech Republic as provided by the MONET Region project between 2005 and 2010

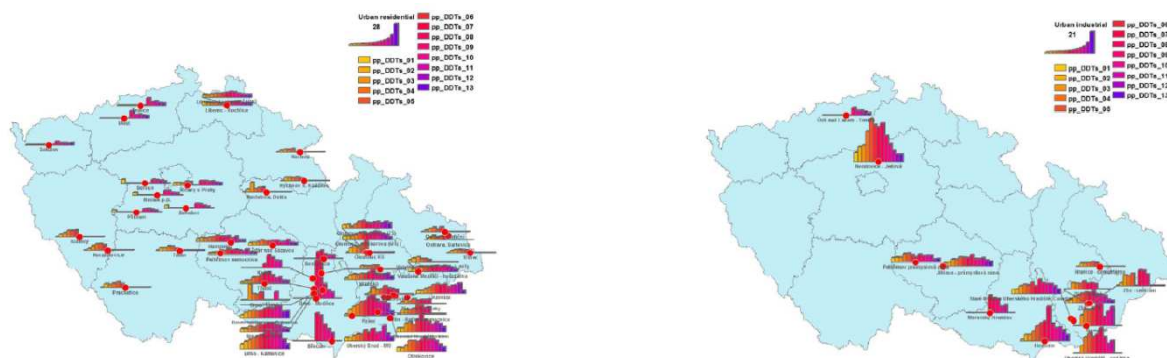
DDT in air of the Czech Republic between 2005 and 2010, shown as DDTs (ng/PUF) for background mountain stations (left) and all background stations (right)



DDT in air of the Czech Republic between 2005 and 2010, shown as DDTs (ng/PUF) for agricultural localities (left) and rural localities (right)



DDT in air of the Czech Republic between 2005 and 2010, shown as DDTs (ng/PUF) for city stations (left) and urban industrial localities (right)



Figures – Source: Klánová, J., Čupr P., Borůvková, J., Kareš, R., Přibyllová, P., Prokeš, R., Kohoutek, J., Komprda, J. a Holoubek, I.: MONET REGION: Application of passive sampling in regional studies focused on monitoring of atmosphere contamination by POPs. (MONET_REGION, 2005 – 10). RECETOX MU Brno. RECETOX REPORT No 405. September 2011.

The concentrations of PCBs in surface waters are mostly in the set of one – tenth to units ng/L and are not significantly different in particular floods. The concentrations of PCBs in sediments and silts are mostly in the range of units to hundreds ng/g. It is apparent their increase in sediments in longitudinal profile of Elbe in Pardubice area (possible influence of chemical plant Synthetia). The decrease of the concentrations of PCBs in Elbe is apparent after meeting with Moldau river, which is not so burden by contamination, but the concentrations again increase due to the other factors (for example paper mill in Štětí).

Other monitored substances, which show properties and characteristic similar to POPs, are so call polycyclic aromatic hydrocarbons (PAHs). It was monitored concentrations of following 15 compounds: naphtalen, acenaphten, fluoren, fenantren, antracen, fluoranten, pyren, benzo(a)antracen, chrysen, benzo(b)fluoranten, benzo(k)fluoranten, benzo(a)pyren, dibenzo(a,h)antracen, benzo(g,h,i)perylen, indeno(1,2,3 – cd)pyren).

The occurrence of massive emission sources of PAHs contamination in Ostrava region, which negatively influenced atmosphere and hydrosphere is known for long time and repeatedly confirmed. It relates with nature and extent of traditional industry, when dominate mining and processing of coal, steelworks and other heavy industrial sectors and therefore also industrial waste waters are often contaminated by PAHs in higher measures.

POPs occurrence in the soils of the Czech Republic

Monitoring of organic pollutants concentrations was provided till the year 1996 this year including with respect to pesticides used, and therefore they were as sampling areas chosen fields each year, were was cultivated wheats. Because of this the file of monitoring sites was different each year. Since 1997 monitoring of concentrations of particular organic pollutants was provided in stable file selected by soil profile in order to notice dynamics of these compounds in soils with regard to possible sources of long – term transport of some substances. The monitoring is provided in total for 40 soil profiles, from which 5 soil profiles are chosen from subsystems soil profiles in the protected sites from non – forest but not distorted soil. The rest of 35 soil profiles is chosen from monitoring of agricultural soils, as from basic subsystem so from subsystem of contaminated localities.

The concentrations of organochlorinated pesticides and HCB in arable land and permanent grassland are balanced, since 2004, when was established and accredited new method of their determination.

Medians of DDT and its isomers concentrations are from a long – term perspective stable in arable soils and in permanent grassland. The concentrations determined in topsoil are higher than in subsoil. The concentrations in arable soils are higher than in permanent grassland. The exceeding of admissible pollution (Decree No 13/1994) took place in 2000 – 2009 most about concentrations of DDT, followed by DDE.

Range of medians of sum 7 PCBs congeners in 2000 – 2009 in the topsoil of arable lands is 1.75 – 6.40 µg/kg, the highest value was determined in 2004. Since this year, the median is going down regularly. The concentrations of congeners in subsoils of arable lands are copying the concentrations in topsoils. These concentrations are slightly lower, they fluctuate in the range 1.75 – 5.5 µg/kg, the highest value was determined again in 2004. Medians of the concentrations of 7 PCBs congeners in permanent grassland and in the protected areas showed the same range and pattern as in arable soil. A value of admissible pollution with PCBs, which is determined in Decree 13/1994 Coll., was in 2009 exceeded in five samples of arable land (2 samples taken from topsoils and 3 samples from subsoils) in three sampling areas. Significant decrease of PCBs concentrations in soils cannot be expected because of high proportional representation of higher chlorinated (and therefore more resistant) PCBs.

The sum of 6 congeners of PCBs was mostly represented in 1998 – 2009 by congeners 153 (29 %), 138 (22 %) and 180 (21 %). Median values of PCBs concentrations slightly decreased since beginning of their monitoring in 1998.

Medians of the sum of 16 PAHs fluctuate between 1997 and 2009 in topsoils of arable lands in the range 538 – 933 µg/kg (decreasing trend was by the value 737 µg/kg in 2009 stopped), in the topsoils of permanent grassland in the range 594 – 1235 µg/kg (the lowest in 2009) and in the topsoil of protected areas in the range of 101 – 303 µg/kg (sustainable status). The values in the subsoils of arable lands are among 276 – 689 µg/kg (maximum in 2001), in the subsoils of permanent grassland 776 – 1309 µg/kg and in undisturbed soils in the range of 77 – 212 µg/kg. The values determined in topsoils are higher than in subsoils.

Transport and POPs

Rapid growth of vehicular traffic in the last decade caused the increase of many problems, out of which the most important, especially for towns, is increasing level of air pollution, which has undoubtedly negative effect on environment and human health. The most problematic are pollutants with proven carcinogenic effects, their concentrations in air are not adjusted by any legislation. In particular polyaromatic hydrocarbons (PAHs), volatile organic substances, solid particules and heavy metals (risk elements). Besides these compounds are generated

by combustion processes in motor vehicles also trace amounts of polychlorinated organic substances – polychlorinated biphenyls (PCBs), dibenzodioxins and dibenzofurans (PCDDs/PCDFs).

PCDDs, PCDFs and PCBs emissions from traffic were in the orders of milligrams in 1993 – 2009. They are mostly produced by older vehicles, do not complying with EURO standards. Decreasing trend in production of this traffic emission is given by replacement of vehicles especially in individual traffic. Database of emission factors COPERT 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. Emission factors of PCDDs and PCDFs are very low, in orders of $\mu\text{g}/\text{km}$, therefore it is probable the origin of this minimum amounts also by combustions of fuel, which does not contain halogen carriers. This assumption is also supported by fact, that the part of database is also emission factors of diesel fuel vehicles, for which halogenated ingredients were not used. PCBs emission was measured in vehicles with ignition engines, and therefore they are reported only for individual transport.

2.3.13.2 POPs content in foods and in selected veterinary commodities

Monitoring of foreign substances in forest ecosystems of the Czech Republic in previous years aimed beside others at survey of the concentrations of selected organic compounds (OCPs, DDT, PCBs, PAHs) in edible mushrooms and forest fruits.

The concentrations of HCHs showed decreasing trend: $0 - 0.33 \mu\text{g}\cdot\text{kg}^{-1}$ in 2005, $0 - 1.31 \mu\text{g}\cdot\text{kg}^{-1}$ in 2006, $0.07 - 0.4 \mu\text{g}\cdot\text{kg}^{-1}$ in 2007, $0.02 - 0.20 \mu\text{g}\cdot\text{kg}^{-1}$ in 2008 and $<0.02 - 0.02 \mu\text{g}\cdot\text{kg}^{-1}$ in 2009. The highest concentration of lindane $0.73 \mu\text{g}\cdot\text{kg}^{-1}$ and $0.76 \mu\text{g}\cdot\text{kg}^{-1}$ was detected in 2006 and 2007; the concentrations in 2008 – 2009 were similarly as in 2005, significantly lower.

The DDT presence in forest fruits was in 2008 – 2009 lower in comparison to 2007. The concentration range of DDT substances was in fungi relatively broad in range of $0 - 15.38 \mu\text{g}\cdot\text{kg}^{-1}$ in 2005, $0 - 38.94 \mu\text{g}\cdot\text{kg}^{-1}$ in 2006, $0.77 - 15.12 \mu\text{g}\cdot\text{kg}^{-1}$ in 2007, $0.06 - 26.69 \mu\text{g}\cdot\text{kg}^{-1}$ in 2008 and $0.15 - 5.85 \mu\text{g}\cdot\text{kg}^{-1}$ in fungi dry matter in 2009. All samples comply with maximum residual limit ($50 \mu\text{g}\cdot\text{kg}^{-1}$).

The sum of PCBs in fungi samples was in the range of $0 - 13.88 \mu\text{g}\cdot\text{kg}^{-1}$ in 2005, $0 - 31.48 \mu\text{g}\cdot\text{kg}^{-1}$ in 2006, $0.77 - 8.49 \mu\text{g}\cdot\text{kg}^{-1}$ in 2007, $0.05 - 3.35 \mu\text{g}\cdot\text{kg}^{-1}$ in 2008 and $0.18 - 3.15 \mu\text{g}\cdot\text{kg}^{-1}$ in 2009. The concentrations determined in forest fruit were in the range of $0 - 6.57 \mu\text{g}\cdot\text{kg}^{-1}$ in 2005, $0 - 11.47 \mu\text{g}\cdot\text{kg}^{-1}$ in 2006, $0.85 - 2.22 \mu\text{g}\cdot\text{kg}^{-1}$ in 2007, $0 - 0.44 \mu\text{g}\cdot\text{kg}^{-1}$ in 2008 and $0.05 - 0.28 \mu\text{g}\cdot\text{kg}^{-1}$ in dry matter in 2009. PCBs concentrations are negligible after conversion to fresh sample.

Hexachlorocyclohexans (α -HCH, β -HCH) were determined in fungi in the concentration range of $0 - 0.94 \mu\text{g}\cdot\text{kg}^{-1}$ in 2005, $0 - 8.92 \mu\text{g}\cdot\text{kg}^{-1}$ in 2006, $0.03 - 0.73 \mu\text{g}\cdot\text{kg}^{-1}$ in 2007, $0.02 - 0.14 \mu\text{g}\cdot\text{kg}^{-1}$ in 2008 and $0.03 - 1.08 \mu\text{g}\cdot\text{kg}^{-1}$ in 2009. Maximum concentrations of lindane (γ -HCH) in fungi were determined $0.28 \mu\text{g}\cdot\text{kg}^{-1}$ in 2005, $6.85 \mu\text{g}\cdot\text{kg}^{-1}$ in 2006, $2.05 \mu\text{g}\cdot\text{kg}^{-1}$ in 2007, $1.2 \mu\text{g}\cdot\text{kg}^{-1}$ in 2008 $0.21 \mu\text{g}\cdot\text{kg}^{-1}$ in 2009. Since 2007 it is apparent decrease of maximum concentrations and also average concentrations of monitored OCPs.

In total it was PAHs in one sample of fungi dry matter found maximum $608.7 \mu\text{g}\cdot\text{kg}^{-1}$ in 2007, $1986.8 \mu\text{g}\cdot\text{kg}^{-1}$ in 2008 and $146.89 \mu\text{g}\cdot\text{kg}^{-1}$ PAHs in 2009. The highest values in 2007 were detected in samples taken in location of Žďárské vrchy, the highest values were determined in 2008 and 2009 in Beskydy. The value from 2009 is incomparably lower than in previous year.

2.3.11.3 Evaluation of the contamination of the food supply in the Czech Republic

Within the System of monitoring the environmental impact on population health of the Czech Republic is monitored the intake of persistent organic pollutants by food supply. Based on determined food consumption by average person is justified repeatedly, that the average chronic exposure dose of persistent organic pollutants, which are monitored within the food consumption basket (PCBs, aldrin, endrin, dieldrin, methoxychlor, endosulfan, heptachlor epoxid, hexachlorobenzene (HCB), lindane, DDT isomers, chlordan, mirex) does not reach values, which could cause the significant risk for health – related harm to the consumer, regarding noncarcinogenic effects of particular compound. The highest intake by food is determined for PCBs; however their intake represents only 3% of tolerated daily intake. The highest intake of dioxine like compounds is determined particularly from butter, fish and fish products.

The exposition of populations by indicator congeners of PCBs is determined since 1994. Since 1999, 7 so called indicator congeners of PCBs (28, 52, 101, 118, 138, 153, and 180) are quantified. The long term comparison of exposure doses to the sum of 7 congeners PCBs in 1996 – 2009 has slightly decreasing trend. Among the most significant sources belong in particular foods of animal origin, with higher fat content, in which PCBs can cumulate. The highest concentration of pesticide residues were determined in veined cheese, fish products and freshwater fish. Higher exposure doses can be expected particularly for population with higher intake of fat of animal origin. The consumption of fat in our population is higher, than is recommended. Even the consumption of animal fat decreases and the consumption of vegetable fat increases, this decline is not sufficient. Special attention should be given to children, for them the exposure dose is naturally higher than for adults. It is important to continue in consistent monitoring of food, in particular food with high fat level; to support reduction

of consumption of animal fat in population; to support the improvement of screening methods in order to better evaluate health risks and to pay attention to other congeners of PCBs, which toxicity in mixture is not exactly defined.

2.3.13.4 Evaluation of the exposure of the Czech populations to the POPs

Concentrations of POPs in human milk are considered good indicators of the actual body burden. In addition, human milk is considered as one of the best sampling matrices for biomonitoring due to its availability and non-invasive approach when collecting individual samples. The results of analysis allow monitoring the long term average population burden; they can be used for risk evaluation during pregnancy and also the extent of POPs intake for breastfed infants. Monitoring of breast milk was continuously provided in the Czech Republic in 1996 – 2008.

Significantly long term decreasing trend of DDT concentrations and other chlorinated pesticides used in 1950s – 1970s is shown in breast milk of Czech mothers. Decreasing trend was determined for PCBs concentrations at the end of 1990s and turn of centuries. The values fluctuation, which is apparent in last years of monitoring, is connected with others monitored areas and the character of trend cannot be estimated yet (till 2003 monitoring in Benešov, Plzeň, Ústí n. Labem, Žďár nad Sázavou, since r. 2005 in Praha, Ostrava, Liberec, Kroměříž, Uherské Hradiště). Dioxine concentration cannot be evaluated with respect to trends so far, because of small amount of data. Polybrominated and polyfluorinated substances are not in recent time monitored.

Repeated surveys coordinated by WHO, which monitored levels of selected POPs in breast milk in a number of countries in 1988, 1993, 2002 a 2005 showed, that there are significant differences among countries. The Czech Republic participated in the last three surveys; dioxin concentrations in breast milk of Czech women were rather at the lower end within countries monitored. On the other side, PCBs concentrations in the Czech Republic were found to be higher comparing to other countries, similarly as in Slovakia. This finding can be to some extent roughly explained by tenth year's delay of prohibition of PCBs production and usage, comparing to western countries. Results of routine monitoring do not show the extreme concentrations in breast milk of Czech women. Anyway there are apparent local differences and the increase of POPs concentration with age.

2.3.13.5 Conclusions

The Czech Republic has historical experience with production and usage of some POPs in its territory during second half of 20th century, connected with their environmental impact. Part of POPs production was reduced already during 1970th and 1980th in 20th. Since 1990, further POPs release reduction followed after social changes, in connection with economic and legislative changes. Many of sources were based on legislation totally removed or reduced and as it is mention in part devoted to the air, it can be seen trend of POPs decreasing concentrations in the environment in different matrices. In the last 20th years took place measures aiming to eliminate the contaminated sites or old burdens. Anyway there are still other localities in the Czech Republic contaminated or potentially contaminated by POPs. Based on last contaminated sites inventory, there exist 1010 localities in the Czech Republic, which are contaminated or potentially contaminated, of which more than 200 are highly contaminated. Integrated monitoring in Košetice and especially the connection of different data sources and their visualization through the information system GENASIS is a valuable source for information about POPs levels in the Czech environment, associated trends and transport among environmental compartment.

3. STRATEGIES AND ACTION PLANS OF NIP

The chapter below shows implementation of activities in action plans of the former NIP (2005) includes new action plans and activities on chemicals recently listed into annexes of the Convention and defines priorities for action in relation to the current needs of the Czech Republic.

This Plan uses new coding of action plans. Table 5 shows links and relations to the former system that is based on the fact that implemented/completed activities were terminated and excluded, but the relevant codes were not deleted (be it short term or long term activity). New action plans and activities are based on the COP report including relevant decisions and reports of the persistent organic pollutants Review Committee; those new plans and activities received new consecutive numbers.

Table 5 Action Plans numbering in the documents related to the implementation of the Stockholm Convention in the Czech Republic

Document	Activity Coding	Explanatory notes on coding including changes
The National Implementation Plan for the Stockholm Convention in the Czech Republic (version 2005)	3.1	3 – NIP chapter code 3.1 – Main strategic objectives
	3.2.1.1	3 – Third chapter of NIP, 2 – action plan code, 1 – short term activities, 1 – activity code
	3.2.2.1	3 – Third chapter of NIP, 2 – action plan code, 2 – long term strategic activities, 1 – activity code
The National Implementation Plan for the Stockholm Convention in the Czech Republic – report on implementation by 31 July 2009 (year 2009)	2.2.1.1	To ensure continuity in the evaluation document, a starting code 2 was used. Former Code of the chapter 3.1 was not shown, the content was kept. Chapter 2 of the evaluation of the NIP, 2 – action plan code, 1 – short term activities, 1 – activity code
	2.2.2.1	Chapter 2 of the NIP evaluation document, 2 – action plan code, 2 – long term strategic activities, 1 – activity code
Updated National Implementation Plan for the Stockholm Convention in the Czech Republic (version 2012)	2.1.1	2 – action plan code, 1 – short term activities, 1 – activity code
	2.2.1	2 – action plan code, 2 – long term strategic activities, 1 – activity code
	New activity	For both short and long term activities do each new activity bear subsequent numbers.
	Implemented or Completed activities	Code of the particular activity is shown, but the description says completed, activity removed

3.1 NIP implementation and main strategic objectives

The Czech Republic could be classified as one of the active Parties implementing the Stockholm Convention within the EU, region of the central and eastern Europe and globally. It has a long – term historical experience with a broad production of POPs in its territory since early 1950s and consequently with effects of the industrial boom and broad use of POPs on the environment.

Large part of POPs production was phased down in 1970s and 1980s; further regulation to limit releases of POPs to the environment took place in early 1990s after the political and legislative changes. Based on adopted legislation and possibility to eliminate certain compounds in relation to implementation of the Stockholm Convention a situation has improved – a number of former sources of contaminants to environment was stopped or moderated and decrease of POPs level in food and human tissues has been observed. Non – industrial sources also emit less POPs, though the decrease is much slower. A number of significant and expensive remediation is ongoing or has been finalized in the country within last 20 years, nevertheless there are still localities that are highly contaminated by POPs and their solution is identified as national priority.

The proposal of the State Environmental Policy for 2012 – 2020 comprises implementation of measures that bring the highest improvements in life conditions and quality of environment as a follow up to the requirements set in environmental MEAs, including Stockholm Convention on persistent organic pollutants. The Czech Republic also emphasises implementation of the sustainable development goals and goals set in the Stockholm Convention to contribute to that effort significantly.

Emphasis was also put on involvement of all stakeholders from the very beginning of the preparation of the first National implementation plan – institutions and organizations – to the implementation of the Stockholm Convention given the broad scope and cross – sectoral character. A multimministerial advisory body governs national supporting institution – the National Centre for persistent organic pollutants – has been set up by

Minister of Environment in November 2006. This body coordinates activities related to POPs and tasks stemming from MEAs. The National Centre is set within the Research Centre for Toxic Compounds in the Environment of Masaryk University in Brno, Czech Republic.

Activities of the National Centre and implementation of the Plan coordinates and oversees a multi – ministerial Council composed of representatives of the MoE , MH, MA, MIT, MD, MEYES, MF and MT and representatives of National Centre for POPs. Its members support implementation of activities set up in Plan at the level of their institutions and nationally they decide on necessary steps leading to a more effective implementation of the Plan, improved cooperation and coordination between ministries. Members of the Council control the progress of the implementation, fine – tuning of strategic goals and defining of priorities in Plan as well as its review and updates.

The following strategic goals have been set for the updated Plan as follows:

Elimination of POPs releases into the environment and reduction of human exposure to POPs;

Preparation of systemic solution to eliminate old environmental burdens;

Elimination of old environmental burdens linked to the former production, use, distribution and or elimination of POPs;

Creation or establishment of facilities collecting wastes containing POPs (and eventually other hazardous substances) is absolutely necessary to safely store such compounds in environmentally sound manner until their permanent disposal would be made available with a maximum use of existing network of waste collection facilities.

Use of BAT/BEP principles (Best Available Techniques/Best Environmental Practices) when preparing strategies to further develop industry in near future;

Draft complex plans to eliminate waste containing POPs including evaluation of impacts of various scenarios on environment and health;

Generation of additional data necessary for true assessment of the scope of burden of POPs in selected areas and optimization of monitoring programmes carried on by individual ministries;

Strengthening control mechanism of implementation of activities of the plan and the information flow at national and institutional level

3.2 Action Plan: Institutional and regulatory measures

3.2.1 Short – term activities (up to 3 years)

Code	Description	Note
3.2.1.1	Adapt the relevant EC legislation in the relation with the SC ratification by the European Community (Council Decision No 2004/259/EC, amending the Directive 79/117/EEC; EP and Council Regulation No 850/2004 on persistent organic pollutants and amending the Directive 79/117/EEC). Responsibility: MoE Deadline: XII/2006	Fulfilled, activity removed
3.2.1.2	Ensure the implementation and consistent monitoring of the fulfilling the requirements of the EU Regulation No 850/2004 and of Council Decision 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills, for instance for waste containing POPs. Responsibility: MoE/CEI Deadline: after VI/2006 continuous	Transferred to long term activities as activity 3.2.2.4
3.2.1.3	Use the technical guidelines concerning POPs, PCB/PCT, pesticides and limits (“low POP content”) adopted at the 7 th Meeting of the Conference of the Parties to the Basel Convention in Geneva (after the approval of the COP to the Stockholm Convention and (its) incorporation into the EU Regulations) for the evaluation/assessment of the POPs containing waste removal/disposal. Responsibility: MoE Deadline: XII/2005	Fulfilled, activity removed
3.2.1.4	Amend, in line with the EU legislation and existing occurrence values, namely the Act on Wastes, Coll. in relation to the POPs management and, further, in particular limit values of POPs in sludge due to the significant environmental risks and to the contamination of the food chains.	As soon as the report is provided – fulfilled, activity

Czech Republic updated national implementation plan
for the Stockholm Convention on persistent organic pollutants in the period 2012 – 2017

	<p>Provide report on progress/completion to the Council of the National Centre for persistent organic pollutants (thereafter “the Council”) by VII/2012</p> <p>Responsibility: MoE, MA</p> <p>Deadline: VII/2012</p>	removed
3.2.1.5	<p>Initiate adjustments of the waste water treatment method for those resulting from the industrial operations (for instance metallurgy or waste incinerators). Provide progress report to the Council.</p> <p>Responsibility: MoE, MA</p> <p>Deadline: XII/2012</p>	Amended (complemented)
3.2.1.6	<p>Update the POPs limit values in soil (Decree No 13/1994 Coll.). Provide progress report to the Council.</p> <p>Responsibility: MoE, MA</p> <p>Deadline: XII/2012</p>	Amended (complemented)
3.2.1.7	<p>Establish the National Centre for persistent organic pollutants. Establish Advisory Body/Board to assist the Stockholm Convention National Contact Point. The Board is composed of experts who prepared the first National Inventory on persistent organic pollutants in the Czech Republic and of other experts.</p> <p>Responsibility: MoE</p> <p>Deadline: IV/2006</p>	Fulfilled, activity removed
3.2.1.8	<p>Develop the Methodical Guideline on issuing the integrated authorizations taking into account the requirements of the Convention, and incorporate therein plans to reduce and prevent the POPs emissions.</p> <p>Responsibility: MoE</p> <p>Deadline: V/2007 X/2012</p>	Unfinished: change responsibility (another department and deadline)
3.2.1.9	<p>Establish criteria for prevention the POPs generation when granting the label “Environmentally Friendly Product” and upon tendering contracts paid from the public budgets. Provide progress report to the Council.</p> <p>Responsibility: MoE</p> <p>Deadline: XII/2007 XII/2012</p>	Uncompleted task: change of deadline and responsibility within the authorities
3.2.1.10	<p>Evaluate benefits of the Integrated Pollution Register (IPR) for the POPs Inventory upon the first emission and transfer of compounds reported by individual users into the IPR. Where appropriate adapt the POPs emission limit values to the CZ conditions and to the need to gain more information on POPs releases into the environment within the IPR. Provide a report to the Council.</p> <p>Responsibility: National Centre will evaluate the situation and coverage of POPs in the Convention, ELV may be amended by MoE proposal</p> <p>Deadline: V/2007 X/2012</p>	Uncompleted task: change of deadline and responsibility within the authorities
3.2.1.11	<p>Participate in development of new regulation for industrial POPs focusing on the prevention of generation of POPs waste and waste with newly listed POPs.</p> <p>Responsibility: MoE</p> <p>Deadline: XII/2011</p>	Fulfilled, activity removed (fulfilled by the EU Industrial Emissions Directive)
3.2.1.12	<p>In relation to the existing/new EU legislation and observed levels of POPs in the environment adopt relevant legislation and set limit values for newly listed POPs in the sludge to minimize environmental risks and risks related to potential food chain contamination. Provide progress report to the Council.</p>	New activity

	<p>Responsibility: MoE, MA Cooperation: MH Deadline: XII/2012</p>	
3.2.1.13	<p>Prepare new MoE methodical guidelines on integrated authorizations that would entail measures of the Convention in relation to minimize emissions and releases of newly listed POPs and prevent their generation. Provide progress report to the Council. Responsibility: MoE Deadline: XII/2012</p>	New activity
3.2.1.14	<p>Control and verify that by – products and chemicals/materials reclaimed from wastes are complying with REACH legislation. CTIA would prepare a report for the Council. Responsibility: CTIA in cooperation with MoE Deadline: first report in XII/2012, then yearly Cooperation: MoE, MIT</p>	New activity
3.2.1.15	<p>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. Responsibility: MoE Deadline: VI/2013 Cooperation: MIT</p>	New activity
3.2.1.16	<p>Discuss amendment of evaluation criteria to grant ecolabelling in relation to POPs content and to scientific progress and change in the market share. Provide minutes of the meeting to the Council. Responsibility: MoE in cooperation with the National Centre Deadline: X/2012</p>	Modified activity former 3.2.2.
3.2.1.17	<p>Provide overview of economic tools (fees, sanctions) available nationally in existing legislation and assess the national need to broaden them to POPs/articles and products containing POPs. Provide report to the Council. Responsibility: MoE Deadline: XII/2012 Cooperation: MIT, MA</p>	New activity former 3.2.2.2

3.2.2 Long – term strategic objectives

Code	Description	Note
3.2.2.1	<p>Support implementation of the Stockholm Convention also through activities and actions within Council for Chemical Safety (advisory body to the Minister of Environment), in particular in relation to newly listed POPs. Provide report to the Council once a year. Responsibility: MoE Deadline: continuous activity Cooperation: all regulatory authorities that are (or will be) members of the Council</p>	Ongoing Modified due to existing institutional arrangement and responsibilities
3.2.2.2	<p>Elaborate a plan for financing tasks arising from the Convention (framework approach). Responsibility: MoE and National Centre Deadline: continuous activity, first proposal by VI/2013</p>	Link to 3.2.1.17.

	Cooperation: MIT, MF, MA, MEYS, MD, MH	
3.2.2.3	Continue to review and update criteria for granting ecolabel in relation to POPs content and draw from experience in science and change in markets. Responsibility: MoE Deadline: continuous activity	Discarded, amended into 3.2.1.16
3.2.2.4	Ensure the implementation and consistent control in relation to the requirements of the EU Regulation No 850/2004 on POPs and of the Council Decision No 2003/33/EC establishing criteria and procedures for the acceptance of waste at landfills (for instance for fly ash from incinerators which could be/are sources of POPs). CEI will provide their plan of controls for 2006 – 2010 linked to POPs issue and their evaluation. Responsibility: MoE (CEI) Deadline: provide plan of controls and assessment report by X/2012, then regular reports until III/ of the following calendar year	Moved from short term activities (former 3.2.1.2) and amended

3.3 Action Plan: Production, export, import, use, stockpiles, landfills and waste of chemicals in Annex A, part I (pesticides)

3.3.1 Short – term activities (up to 3 years)

Code	Description	Note
3.3.1.1	As a follow up to the POPs inventory in 2004 revise list of facilities previously identified as sites of organochlorine pesticides (OCPs) preparation or storage prior 1989 and explore levels of POPs there in (scope of contamination). Provide report to the Council Responsibility: MA, MoE Deadline: IX/2012	Modified
3.3.1.2	Update the former plan of removal and destruction of obsolete chlorinated POP pesticide stocks including plan of the decontamination of sites where OCPs had been stored. Provide report to the Council Responsibility: MoE, MA Deadline: VI/2012	Ongoing and modified
3.3.1.3	Build on the conclusions of the POPs contaminated sites inventory performed in 2008 – 2010 and broaden national monitoring activities in the MONET_CZ network to the monitoring of some contaminated sites and existing decontamination/destruction facilities in relation to potential releases of, in particular, organochlorine compounds from obsolete stocks in bulk prior their decontamination/destruction. Provide a report to the Council Responsibility: MoE, CEI Deadline: XII/2012 Cooperation: National Centre	New activity
3.3.1.4	Draw from data available in the national pollution and release register (IPR) and evaluate POPs pesticide presence in wastes and their releases into soil and clarify potential need to amend legislation laying down the reporting to the register. Responsibility: MoE, CEI Deadline: XII/2012 Cooperation: MIT, CEI, MA	New activity

3.3.2 Long – term strategic objectives

Code	Description	Note
3.3.2.1	Organochlorinated pesticides (OCPs) must further remain a part of the monitoring programmes based on 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 Responsibility: MA, MH, MoE Deadline: continuous activity (report VI/each calendar year)	Ongoing
3.3.2.2	Process information on POPs sources and emissions including waste issues (landfills and old burdens) and include them to monitoring and assessment activities of the state of the environmental compartments. Supply such data (eventually annually) to the National POPs Inventory. Provide a progress report once a year to the Council Responsibility: MoE, National Centre will update inventory by MoE data Deadline: continuous activity	Ongoing
3.3.2.3	As a follow up to the POPs inventories in 2004 and 2008 – 2010, set up regular controls of agrochemical storage facilities by SPA and CEI and fill in information on certain missing localities into the inventory. Provide a report on outcome of performed controls/checks and plan for the following year to the Council Responsibility: MA, MoE Deadline: continuous activity, report by X/calendar year Cooperation: CEI, SPA	In progress as long term activity, former 3.3.1.1
3.3.2.4	Prepare program of safe destruction of remaining obsolete stocks of chlorinated pesticides by best available techniques. The program will also include those facilities/localities that stored OCPs. First draft of the program to the Council for discussion/consideration Responsibility: MA in cooperation with MoE Deadline: X/2012	Long term activity, follow up to the finalization of the POPs contaminated sites inventory
3.3.2.5	Ensure monitoring of old environmental burdens (sites) and follow impact/effect of their remediation including health and environmental risk assessment. Provide a progress report once a year to the Council. Responsibility: MoE Deadline: continuous activity Cooperation: MA, MIT, MH	New activity

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

3.4.1 Short – term activities (up to 3 years)

Code	Description	Note
3.4.1.1	Finalize, validate and oversee the national PCB Inventory (contaminated sites, old burdens). Include the issue to the national management system. Controls of facilities in PCBs inventory continue on those allowed to remain in operation upon satisfying certain criteria also post 2010 (deadline in EU legislation). Provide a report to the Council once a year. Responsibility: MoE	Ongoing

	Deadline: XI/2012 and then yearly until 2015 inclusive Cooperation: all ministries	
3.4.1.2	Design integrated management of waste with PCBs that leads to recollection system ensuring safe storage until an acceptable/environmentally sound method of PCB elimination is available to be used by the existing collection systems. Provide a report to the Council once a year. Responsibility: MoE Timetable: XII/2011, then until 2014 inclusive	Ongoing
3.4.1.3	Consider the requirements of the Convention within the update of the Waste Management Plan, particularly in the action plans and regional waste management plans, as to clarification of the list of generators as well as and the quantified information on the production of waste with PCBs. Use IPR/IPR outputs to specify the content of PCBs and other POPs in wastes. Provide a report to the Council. Responsibility: MoE Deadline: VII/2013	Ongoing
3.4.1.4	Evaluate effectiveness of measures in Guidance by MoE and other materials. Provide progress report to the Council. Responsibility: MoE Deadline: XII/2012 Cooperation: MIT, MD, MT	Activity will be completed upon submission of the report, then removed Guidance however, remains in use

3.4.2 Long – term strategic objectives

Code	Description	Note
3.4.2.1	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. Provide yearly report to the Council. Responsibility: MoE Deadline: continuous activity Cooperation: MIT	Ongoing
3.4.2.2	Control thoroughly 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 and thorough checks. Provide a yearly report to the Council. Responsibility: MoE and CEI Deadline: continuous activity	New activity
3.4.2.3	Support environmentally acceptable methods of decontamination of devices containing PCBs, including their verification of effectiveness of the decontamination. Provide final report to the Council. Responsibility: MoE Deadline: end 2012 Cooperation: MIT, MD, MT	Upon submission of the final report will be fulfilled and removed
3.4.2.4	Verify, within grants provided by the MoE or by other sources, the parameters and ecological non – harmfulness and costs of the biological decontamination	Deleted, activity moved

	<p>of low – burdened soils given the great significance of the clearance of such contaminated soils Responsibility: MoE Deadline: continuous activity</p>	<p>to plan 4.2. due to change in research and development strategy in the Czech Republic</p>
3.4.2.5	<p>Remove PCB, PCB wastes and devices containing PCBs in line with the Act No 185/2001 Coll., and with the EU Directive No 96/59/EC respectively. Ensure thorough removal/controls. Provide report to the Council. Deadline: XII/2010 – removal I/2011, XII/2011 – progress reports Responsibility: MoE Cooperation: all ministries Explanation: End of 2010 was deadline for removal of PCBs in the EU. Controls of facilities in PCBs inventory continue on those facilities allowed to remain in operation upon satisfying certain criteria also post 2010.</p>	<p>Majority of the activity completed, Complementary controls continue – see explanation on the left.</p>
3.4.2.6	<p>Provide thorough control of the PCBs inventory nationally, update and add localities (contaminated sites, old environmental burdens). Responsibility: MoE, CEI Deadline: continuous activity, yearly report Cooperation: all ministries</p>	<p>New activity</p>

3.5 Action Plan: Production, import and export, use, stocks and wastes containing DDT (Annex B) if used in the Party

DDT is not produced, imported or used in the Czech Republic. Obsolete stocks and wastes are covered in the chapter of organochlorinated pesticides (OCPs) see chapter 3.3; see part 3.7. for contamination and monitoring in the chapter 3.11.

3.6 Action Plan: Releases of unintentionally produced chemicals (PCDDs/Fs, HCB and PeCB)

3.6.1 Short – term activities (up to 3 years)

Code	Description	Note
3.6.1.1	<p>Perform emission inventory for HCB, PeCB and PCBs and finalize PAHs and PCDDs/Fs inventory to all environmental compartments, wastes and products. Its findings shall be taken into account when preparing other strategic documents (SEP, Waste Management Plan, BREF documents, etc.). Provide financial and project support for inclusion of new POPs. Responsibility: MoE, CHMI, National Centre Deadline: XII/2012</p>	<p>Complemented prolonged</p>
3.6.1.2	<p>Draw a plan reducing the content of chlorinated and of brominated substances in the environment, in wastes and in products taking into account the national inventory. Accountability: MoE Deadline: XII/2012</p>	<p>Complemented prolonged</p>
3.6.1.3	<p>Urgently solve problems related to the production of and handling of waste HCB and to risks associated with the HCB waste transport. Provide information on the current situation in a report to the Council. The</p>	<p>Ongoing</p>

	<p>information could be released publicly only after being considered by the Council and a specific consent is provided by the relevant stakeholder.</p> <p>Accountability: MoE Deadline: VI/2012 Cooperation: MIT, MT</p>	
3.6.1.4	<p>Provide a summary report on POPs handling in facilities that are classified (facilities operated by the Ministry of Defense or Czech Army in a restricted regime).</p> <p>Responsibility: MD Deadline: end of 2012</p>	Ongoing Completed for PCBs
3.6.1.5	<p>Provide a situation report and technical – economic analysis on the coal combustion in households as the Czech emission inventory showed a significant POPs releases from local sources combusting solid fuels.</p> <p>Responsibility: MoE Deadline: VII/2012 Cooperation: MIT</p>	Transferred from 3.6.2. – action plan amended
3.6.1.6	<p>Provide reports from the project on emissions from coal, wood and biomass burning in small local sources and co – incineration of wastes in households to the Council and use them to improve the national inventory.</p> <p>Air Protection Department (MoE) will provide the Council with a report on the project and plan for the further use of the findings in practice.</p> <p>Responsibility: MoE Deadline: XII/2012 Cooperation: MIT</p>	Transferred from 3.6.2.

3.6.2 Long – term strategic objectives

Code	Description	Note
3.6.2.1	<p>As a follow up to the strategy reducing POPs emissions from incinerators in line with the implementation of the POPs Protocol (CLRTAP convention) control thoroughly the compliance with acceptable operation of facilities incinerating wastes and provide information on releases of other POPs (PAHs, HCB, PeCB, PCBs) and their content in wastes from incinerators.</p> <p>Provide report including information on POPs levels to the Council once a year.</p> <p>Responsibility: CEI supported by the MoE Deadline: continuous activity, report in November</p>	Complemented
3.6.2.2	<p>Provide a thorough control of the whole life cycle of ashes from heat production, incinerators or pyrolysis facilities. The Czech Environmental Inspectorate will provide a report to the Council once per year.</p> <p>Responsibility: CEI Deadline: continuous activity, report submission ideally each October Cooperation: MoE, MIT</p>	Complemented
3.6.2.3	<p>Target 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.</p> <p>Provide a situation report to the Council once per year; first one X/2012</p> <p>Responsibility: MoE Deadline: continuous activity</p>	Complemented Waste part Ongoing
3.6.2.4	<p>Measure POPs emission factors in mobile sources in order to render national emission inventory more precise (in particular non – road transport – army,</p>	Complemented

	<p>agriculture, forestry etc.). Provide a situation report until X/2012. Responsibility: MoE Deadline: continuous activity Cooperation: MD, MT, MA</p>	
3.6.2.5	<p>Continue to identify and monitor potential sources of undesired unintentional POPs emissions – such as biomass combustion, pentachlorophenol and creosote in wood treatment facilities, fires of landfills and fires in industrial facilities. Provide a situation report to the Council once per year; first one X/2012. Responsibility: MoE and CHMI Deadline: continuous Cooperation: firefighters</p>	Complemented
3.6.2.6	<p>Continue to provide a thorough ambient air burden of all POPs characterization of the territory 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. Provide a situation report to the Council once per year; first one X/2012 Responsibility: MoE, National Centre Deadline: continuous activity Cooperation: MH</p>	Complemented – links to 3.11. (monitoring) and 3.10. (information sharing)
3.6.2.7	<p>Submit information to the Integrate Pollution Register (IPR) on emissions from metallurgy (heat production and combustion or pyrolysis processes) to provide more precision in available data. Initiate a collection from protocol measuring POPs releases and relevant technical data on those sources to evaluate situation and propose further potential steps in reducing POPs emissions. Provide a situation report to the Council once per year; first one XII/2012. Responsibility: MoE, CHMI and National Centre Deadline: continuous activity; report is submitted in December each year</p>	New activity
3.6.2.8	<p>Update emission inventory for sources such as crematoria, veterinary incineration facilities, incineration of hospital waste, metallurgy, paper production technology etc. Provide a situation report to the Council once per year; first one XII/2012 Responsibility: MoE and CHMI Deadline: continuous activity Cooperation: National Centre</p>	New activity

3.7N Action Plan: Production, export and import, use, stockpiles and wastes containing newly listed POPs (Annexes A and B) – PFOS, PBDEs, HCHs, HBB, endosulfan and PeCB

3.7N.1 Short – term activities (up to 3 years)

Code	Description	Note
3.7N.1.1	<p>Provide inventory of sources, uses and occurrence of newly listed POPs (PFOS, PBDEs, HCHs, PeCB, endosulfan, HBB) in the Czech Republic. Provide information to the Council in the format „inventory of new POPs in the</p>	New activity

	Czech Republic “. Responsibility: National Centre and MoE Deadline: pilot data XII/2012 the latest, yearly updates until 2015 inclusive Cooperation: all ministries	
3.7N.1.2	Evaluate and pilot test recycling of materials containing brominated flame retardants (PBDEs) in line with legislation in force (EU Regulation No 850/2004 as amended). Include also potential to sell in the market (price and demand for recycled materials/products) in the evaluation. Provide report to the Council by XII/2012. Responsibility: MoE and National Centre Deadline: XII/2012, updates every year until 2015 inclusive Cooperation: MIT	New activity
3.7N.1.3	Finalize evidence of occurrence of hazardous substances including newly listed POPs in the road and rail transport. Provide a situation report to the Council. Responsibility: MT Deadline: IX/2012	New activity
3.7N.1.4	Prepare a summary report on the management of newly listed POPs in devices that fall into the competence of the MD or Czech Army. Responsibility: MD Deadline: end of 2012	New activity – follow up of 3.6.1.4.
3.7N.1.5	Finalize the inventory for disposal of wastes containing new POPs from transport (cars, tyres, rod reconstruction) to diminish uncertainty related to the performance of the elimination/disposal at a range of facilities (various level of development). Provide situation report to the Council by X/2012. Responsibility: MoE Deadline: X/2012 Cooperation: MT	New activity
3.7N.1.6	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. Provide a situation report to the Council by X/2012. Responsibility: MoE Deadline: XII/2012	Modified due to new listings
3.7N.1.7	Include newly listed POPs and current candidate POPs into the revised National Waste Management Plan at all levels – use the inventory (3.7N.1.1) as a basis. Provide progress report to the Council. Responsibility: MoE Deadline: V/2013 Cooperation: regional offices	New activity
3.7N.1.8	Ensure inventory of old environmental burdens and contaminated sites containing newly listed POPs and insert this information into the SESEZ database/data repository. Provide information on the findings including a proposal for next steps – plan and (sequence of) measures to be taken. Provide situation report to the Council. Responsibility: MoE Deadline: X/2012 Cooperation: departments of environment in the regional authorities	New activity

3.7N.2 Long – term strategic objectives

Code	Description	Note
3.7N.2.1	<p>Prepare a plan for managing wastes containing polybrominated diphenyl ethers (PBDEs) and other brominated compounds – flame retardants – based on performed inventory. The goal is to reach maximum permissible recycling of material that contains or potentially contains such chemicals. Include the outputs into the currently performed review and update of the National Waste Management Plan.</p> <p>Provide report to the Council.</p> <p>Deadline: continuous activity, first report in V/2013</p> <p>Responsibility: MoE</p> <p>Cooperation: MIT</p>	New activity – follow up of 3.7N.1.7
3.7N.2.2	<p>Provide information on the outcome of controls on PBDE content in products from recycled plastics. Provide report to the Council.</p> <p>Deadline: continuous activity, first report X/2012 – perform screening/inventory at national level</p> <p>Responsibility: MoE/ CEI, CTIA</p> <p>Cooperation: MIT</p>	New activity
3.7N.2.3	<p>As a follow up to the 3.7.N.1.2. and in line with criteria of efficiency/effectiveness and cost/resource efficiency define and introduce/implement procedures for separation/elimination of flame retardants from wastes that (wastes) would be recycled.</p> <p>Provide situation report to the Council.</p> <p>Deadline: continuous activity, first report XII/2012</p> <p>Responsibility: MoE</p> <p>Cooperation: MIT</p>	New activity – follow up of 3.7N.1.7
3.7N.2.4	<p>Ensure a representative data collection on PFOS (and its salts, or PFOA) content in products/articles.</p> <p>Provide a report to the Council</p> <p>Responsibility: MoE in cooperation with the National Centre</p> <p>Deadline: XII/2012</p>	New activity

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: pesticides, DDT, PCBs and HCB (Annexes A, B and C)

3.7.1 Short – term activities (up to 3 years)

Code	Description	Note
3.7.1.1	<p>Finalize the inventory of old ecological burdens and of contaminated sites and include the findings into the SESEZ database. Provide information on the outcomes including proposal for further action/measures.</p> <p>Responsibility: MoE</p> <p>Deadline: XII/2011</p>	Fulfilled, activity removed, after report submission it continues as a long term activity 3.8.2.

3.7.2 Long – term strategic objectives

Code	Description	Note
3.7.2.1	<p>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. Evaluate necessary investment needs to amend technologies and search for co – financing where relevant. Provide a situation report.</p> <p>Responsibility: MoE Deadline: XII/2011</p>	Transferred to 3.7N.1.6
3.7.2.2	<p>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.</p> <p>Responsibility: MoE Deadline: XII/2011 Cooperation: MH, MIT</p>	Complemented
3.7.2.3	<p>Monitor/Follow systematically existing decontamination facilities in relation to releases of organochlorinated chemicals from deposited materials prepared for decontamination including assessment of potential risks on health and environment. Provide a situation report to the Council by X/2012.</p> <p>Deadline: continuous activity Responsibility: MoE, CEI, MA</p>	New activity
3.7.2.4	<p>Implement BAT/BEP when eliminating wastes with POPs including new POPs should such guidelines be available. In other cases strive to minimize releases of POPs to diminish potential impact on health and environment. Provide a situation report to the Council by X/2012.</p> <p>Deadline: continuous activity Responsibility: MoE Cooperation: MIT, CEI</p>	Amended to reflect the reality

3.8 Action Plan: Identification and corresponding management of contaminated sites (Annexes A, B and C)

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

Code	Description	Note
3.8.1.1	<p>Prepare the proposal for and execute the National Program of old environmental burdens containing POPs. The proposal is aimed at ensuring the systematic approach to the inventory, to coordination of the solution, preparation and creation sources of funding of individual solutions.</p> <p>Responsibility: MoE Deadline: III/2011</p>	Fulfilled, activity removed
3.8.1.2	<p>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. The aim is to provide a framework solution of the issue including management of health and environmental risks.</p> <p>Responsibility: MoE Deadline: III/2012 Cooperation MH</p>	Ongoing

3.8.2 Long – term strategic objectives

Code	Description	Note
3.8.2.1	<p>Conduct a rigorous inventory of contaminated sites including the preliminary assessment of the potential health and environmental risks; use this assessment for the future risk analyses and for the evaluation of needs to remediate/decontaminate including economic assessment of such action. This step is to be considered fundamental part of the contaminated sites (old environmental burdens) management.</p> <p>Provide information on the findings including a proposal of further steps and measures.</p> <p>Responsibility: MoE</p> <p>Deadline: report – each year until 2014, first report X/2010</p> <p>Cooperation: MH</p>	Amended
3.8.2.2	<p>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.</p> <p>Provide information on performance and situation report each year.</p> <p>Responsibility: MoE</p> <p>Deadline: continuous activity, first report X/2011</p>	Complemented
3.8.2.3	<p>Ensure prevention of creation new environmental burdens.</p> <p>Responsibility: MoE and CEI</p> <p>Deadline: continuous activity</p>	Fulfilled, activity removed
3.8.2.4	<p>Perform controls of both contaminated and remediated sites – use conclusions of the inventory of environmental burdens to show also potential sources of problems.</p> <p>Provide situation report to the Council by X/2012.</p> <p>Responsibility: MoE and CEI</p> <p>Deadline: continuous activity</p>	Amended
3.8.2.5	<p>Continue to support research evaluating contribution of POPs volatilization/re – evaporation from soils, landfills and water reservoirs to the total POPs emissions in the Czech Republic.</p> <p>Focus on following existing decontamination facilities regarding POPs volatilization from material prepared to decontamination/incineration.</p> <p>Responsibility: MoE</p> <p>Deadline: continuous activity</p>	Moved from chapter 3.6.

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

3.9.1 Short – term activities (up to 3 years)

Code	Description	Note
3.9.1.1	<p>Establish National Centre for persistent organic pollutants</p> <p>Responsibility: MoE</p> <p>Deadline: 2006</p>	Fulfilled, activity removed
3.9.1.2	<p>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).</p> <p>Report to the Board of the National Centre: by VI/2012</p>	New activity, link to 3.10.

	Responsibility: MoE and National Centre Deadline: first report June 2012, furthermore continuously, at least once every 6 months Cooperation: all ministries and other interested stakeholders	
3.9.1.3	Publish text of relevant BAT/BEP/BREF documents (on POPs) in Czech on the website of the National Centre. Provide a situation report to the Council by XII/2012. Deadline: first report December 2012, furthermore continuously, at least once every 6 months	New activity, link with 3.7 – 3.10.

3.9.2 Long – term strategic objectives

Code	Description	Note
3.9.2.1	Improve and make more effective 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 progress report to the Council; first report X/2012 Responsibility: MoE Deadline: continuous activity	Reworded
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 National Centre. The Centre will provide the first report to the Council by X/2012. Responsibility: National Centre Deadline: continuous activity, by October of each calendar year Cooperation: all Council members	Ongoing
3.9.2.3	Continue to ensure effective cooperation on POPs between ministries either via Council of the National Centre for POPs, Council for Chemical Safety and via particular activities of the National Centre such as – providing data on national inventory, cooperation on POPs monitoring and support development of data information system to assess environment and potential health risks (GENASIS). Focus on timely completion of tasks and functional information flow (both ways). Provide a progress report to the Council; first report by X/2012 Responsibility: Council of the National Centre, the report is prepared by the National Centre Deadline: continuous activity, by October of each calendar year Cooperation: all Council members and their institutions	Ongoing
3.9.2.4	Provide a durable and sustainable funding to support functioning of the National centre for persistent organic pollutants. Responsibility: all Council members and their institutions Deadline: continuous activity, provide information into the yearly report on the current situation (submitted to the Council by June each year). The report preparation coordinates National Focal Point of the Stockholm Convention (MoE, Department of Environmental Risks and Ecological Damage)	Ongoing

3.10 Action Plan: Public awareness, information and education

3.10.1 Short – term activities (up to 3 years)

Code	Description	Note
3.10.1.1	<p>Provide and publish information on current situation on technology used and technical/feasibility and economical analysis regarding emissions from coal burning in households as the emission inventory shows a significant contribution from local sources burning solid fuels to the total of POPs emissions. Provide a report to the Council.</p> <p>Responsibility: MoE, National Centre Deadline: VI/2012</p>	Activity transferred from 3.6.1.5.

3.10.2 Strategic goals of NIP to strengthen public awareness, information and education

Code	Description	Note
3.10.2.1	<p>Continue to increase the public awareness and education concerning POPs and prevention of their generation (i.e. from wastes containing POPs, local heating or burning, see also 3.10.1.1.) and link existing information.</p> <p>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 societies organisations. MEYES will focus its attention to support progress in providing new education courses on chemicals management, sustainable chemistry, life – cycle analysis, environmental impact assessment and risk assessment (both health and environment).</p> <p>Information is to be provided to the National Centre that provides a summary report to the Council. The report is published at the National Centre website.</p> <p>Responsibility: MoE, MEYES, MH, National Centre Deadline: continuously, first information provide by X/2012 Cooperation: other departments, universities and university associations</p>	Amended wording, ongoing
3.10.2.2	<p>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 who prepares a summary report and submits it to the Council.</p> <p>Responsibility: MoE, National Centre Deadline: continuously, first report by X/2012 Cooperation: MEYES and other Council members</p>	Ongoing
3.10.2.3	<p>Ensure the public access to the information on POPs in an acceptable and comprehensible form. As a follow up to the National 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.</p> <p>Responsibility: National Centre Deadline: continuously, first report by X/2012 Cooperation: MoE, MH, MA</p>	Ongoing
3.10.2.4	<p>Continue to perform awareness programmes nationally, regionally and locally. Prepare and consider targeted campaigns (national) at the meeting of the Council (regularly). Provide information on existing/ongoing/new campaigns to the National Centre.</p> <p>Responsibility: MoE, MEYES</p>	Ongoing

	Deadline: continuous activity Cooperation: all Council members	
3.10.2.5	Promote the POPs issue into the EU funding programmes and to the priority themes supported by grant agencies that support civil society activities (including NGOs). Provide a progress report to the Council by XI/2012. Responsibility: MoE, SEF CR, MEYES, MIT Deadline: every year between 2012 and 2015 inclusive	New activity

3.11 Action Plan: POPs monitoring

3.11.1 Short – term activities (up to 3 years)

Code	Description	Note
3.11.1.1 – 4	Fulfilled, activities removed	Text reworded into 3.11.2.1
3.11.1.5	Optimize sampling and analytical methods for POPs in the Czech Republic linked to the requirements of the Global Monitoring Plan of the Stockholm Convention and to Article 16 of the Convention. Provide a regular progress reports to the Council. Responsibility: National Centre Deadline: continuous activity, report once a year	New activity
3.11.1.6	Provide and validate analytical methods for long – term monitoring of newly listed POPs and candidate POPs in relevant matrices (i.e. PFOS, SCCPs etc.) to ensure pilot data to national inventory of POPs. Responsibility: MoE and National Centre Deadline: pilot data by end of 2013 Cooperation: MEYES, CHMI	New activity
3.11.1.7	Ensure data collection for PFOS content in water (pilot) – new core matrix for Global Monitoring Plan. Responsibility: MoE and National Centre Deadline: pilot data by end of 2013 Cooperation: MA, CHMI	New activity

3.11.2 Long – term strategic objectives

Code	Description	Note
3.11.2.1	Perform POPs monitoring in line with decisions SC – 3/19, 4/19, 5/21 (and with the National Strategy for POPs Monitoring. Long – term sustainable monitoring for all POPs listed in the Stockholm Convention in their core matrices is a priority. Continue to review scope of POPs and matrices to take into account future development in listing. The key parts of the long term monitoring and assessment comprise: Existing long term monitoring at the Košetice observatory (EMEP observatory), optimized national monitoring network MONET_CZ for POPs monitoring in air by passive sampling, long – term monitoring of breast milk and other form of biomonitoring, information system GENASIS together with its experts. Deadline: pilot data on new POPs by end of 2013, otherwise provide a progress report to the Council through national inventory (yearly updates) Cooperation: MA Responsibility: MoE, MH, CHMI and National Centre	Reworded to the new task 3.11.1.1 – 4
3.11.2.2	Define cooperation between institutions providing POPs monitoring in the	New activity

	<p>Czech Republic, in particular for POPs in core matrices of the Stockholm Convention bearing in mind need for harmonization of programmes and optimization of resources/costs.</p> <p>Responsibility: MoE, MH and National Centre</p> <p>Deadline: pilot data by end of 2013, otherwise continuous activity</p> <p>Cooperation: MA, CHMI</p>	
3.11.2.3	<p>Ensure uniform and a long term sustainable reporting format and a regular/continuous flow of information to the JIŽP associated GENASIS information system/data repository so that analysis of ecological and health risks and evaluation of time trends could be performed in a long term.</p> <p>Responsibility: MoE, MH, National Centre</p> <p>Deadline: continuously, each year or according to sampling campaigns (WHO)</p> <p>Cooperation: MA, CHMI</p>	New activity
3.11.2.4	<p>Include brominated and fluorinated chemicals to the long term integrated POPs monitoring activities – observatory in Košetice</p> <p>Responsibility: MoE and National Centre</p> <p>Deadline: pilot data by end of 2013, otherwise continuously</p> <p>Cooperation: MA, CHMI</p>	New activity
3.11.2.5	<p>Include brominated and fluorinated chemicals to the long term biomonitoring activities – breast milk in the Czech Republic as well as blood (if possible).</p> <p>Responsibility: MH and NIPH</p> <p>Deadline: pilot data by end of 2013</p> <p>Cooperation: National Centre</p>	New activity

3.12 Action Plan: Reporting

3.12.1 Strategic goals

Code	Description	Note
3.12.1.1	<p>Ensure a timely submission of the CZ report under the article 15 (reporting) and 16 (effectiveness evaluation). Deadlines for each reporting cycle are provided in decisions taken by the Conference of the Parties.</p> <p>Responsibility: MoE and National Centre</p> <p>Deadline: set in the COP decisions</p> <p>Cooperation: MH, MA, MIT</p>	This is a obligation for each Party enshrined in the Convention text
3.12.1.2	<p>Process the findings of the POPs inventory and implementation of NIP goals/activities regularly. 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.</p> <p>Responsibility: MoE</p> <p>Deadline: annually</p> <p>Cooperation: MH, MA, National Centre</p>	Reworded to mirror existing institutional relations
3.12.1.3	<p>Prepare a regular yearly evaluation of the NIP implementation and submit it to the Council for consideration (1x year at a minimum).</p> <p>Responsibility: MoE and National Centre</p> <p>Deadline: continuous activity, first time X/2012</p>	New activity
3.12.1.4	<p>Ensure a regular information flow to the public on the NIP implementation at least once per year.</p> <p>Responsibility: National Centre</p> <p>Deadline: continuous, first report XII/2012</p> <p>Cooperation: all ministries</p>	New activity

4. PROPOSALS OF THE FURTHER DEVELOPMENT, CAPACITY BUILDING AND PRIORITIES

4.1 Priorities of the updated NIP reflecting the expected global development of the POPs management (period 2012 – 2020)

4.1.1 Long term priorities

Considering the past implementation of NIP in the Czech Republic, developments in the Stockholm Convention and expected global developments in the chemicals management and waste issues for 2012 – 2020 we set long term priorities for the updated Plan for Czech Republic as follows:

- Continuous update of the national POPs inventory including newly listed POPs
- Elimination of existing POPs and wastes with POPs – locality “Lhenice” and others
- Identification and set up of remediation for POPs contaminated localities based on the performed inventory of these sites
- Support development of new technologies for disposal, remediation and clean up
- Secure organization and funding for POPs monitoring in line with Global Monitoring Plan in line with the adopted National Strategy for POPs monitoring in the Czech Republic and reflecting new (POPs) listings
- Support development of the GENASIS system (organisationally and financially)
- 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
- Provide a continuous support for functioning of the National and Regional Centre in the Czech Republic

These priorities also serve as a follow up to the international workshop that the National Centre organized in Brno 21 – 23 May 2011, in cooperation with the secretariat of the Stockholm Convention and other organizations (see Annex 2).

4.1.2 Short term priorities and goals/tasks

Considering the past activities, current strategic documents and review of the implementation of the previous NIP, the current priority issues for 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 create obstacles that would inhibit the Czech Republic’s compliance with the EU POPs legislation requirements.
- Further development of the GENASIS information system/data warehouse
- Continuous monitoring of occurrence of POPs including newly listed compounds through a national monitoring network MONET CZ (including candidate POPs – SCCPs, HBCDD, PCNs, hexachlorobutadiene and pentachlorophenol) – including 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 partnership 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: all ministries in cooperation with National Centre

Deadline: evaluation 1x year at ta minimum, the Council will prepare a situation report by end of each calendar year, first one by XII/2012

Cooperation: all members of the Council

4.1.2.1 Update waste collection guidelines/procedure in the National Waste Management Plan, in particular for waste containing newly listed POPs (polybrominated and polyfluorinated compounds).

Responsibility: MoE

Deadline: XII/2012

Cooperation: CEI, National Centre

4.1.2.2 Ensure continuous funding for the National Centre in line with the requirements stemming from the Convention and decisions by the COP and its implementation.

Responsibility: MoE

Deadline: continuous (each year in June)

Cooperation: all other ministries/stakeholders

4.1.2.3 Identify financial resources/instruments to support elimination of old environmental burdens with POPs contamination.

Responsibility: MoE

Deadline: as soon as possible

Cooperation: MIT, MA

4.1.2.4 In the framework of the National strategy of research and development in the Czech Republic for 2007 – 2014 support research and development in POPs field (elimination, emissions, fate – transport and transformation, management, effects) and submit project proposals for consideration in the MoE Vice – Ministers Board, to the GACR and Technological Agency of the Czech Republic for preparing calls and reflecting priorities set in NIP.

Responsibility: MoE, Scientific Council of the Minister of Environment, National Centre

Deadline: continuous up to 2013

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 (SCCPs), fluorinated items and others.

On polycyclic aromatic hydrocarbons (PAHs) to aim at monitoring of further compounds from this group beyond the scope of PAHs recommended by US EPA

Revolatilization of POPs from remediations and bioremediations

Study emissions from biomass burning

Study releases from contaminated sites, soils, landfills or buildings

Study co – incineration of hazardous wastes

Development of procedures for monitoring POPs from mobile sources

Support research and development projects, in particular on development of technologies to eliminate POPs from all environmental compartments; the project should be supported in particular by MIT and MoE

Undertaking epidemiological study that relates levels on contamination to potential health risks/implications

Responsibility: MoE; in cooperation with the NIPH – epidemiological study

Deadline: continuously

Significant research fields/tasks/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 the Stockholm Convention:

Validation of transport and distribution models as well as for studies of atmospheric processes and deposition and revolatilization 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 physico – chemical properties of POPs in a range of climatic conditions as a baseline to study exchange processes air – soil, air – water that are strongly temperature dependent;

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 (i.e. Polybrominated chemicals, chlorinated parafins, toxaphene etc.), superhydrophobic 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 environmental mixtures;
Verify parameters, ecologic and health effects/insignificance and costs of biological decontamination of low – level contaminated soils as this information may have a great impact on minimising contamination;

Responsibility: MoE, GACR, Czech Academy of Science, MH, MA, National Council for Research and Development, Technological Agency of the Czech Republic

Deadline: continuously

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.

Report on the implementation of the NIP by end of each calendar year – first report in 2013.

Establish control mechanism to oversee implementation of the Plan – 1 year after the government approval.

Ensure more effective cooperation of all ministries/stakeholders involved in implementation of action plans (in comparison with the previous period) – within 2 years from the Plan approval by the government.

Implementation of priority activities for the short term (part 4.1) – within 2 years from the Plan approval.

Evaluate and review updated NIP implementation – September 2015.

Reach long term goals in the National implementation plan – within 10 years from the approval by the government.

6. CONCLUSIONS ON THE IMPLEMENTATION OF NIP

Short term activities in the former Plan (version 2006) were implemented in majority by now. Should there be an “ongoing” label in some cases, it is usually caused by the fact that the activity itself or requirements embedded in the convention call for a continuous activity and over a long – term or sufficient capacity (legislative, financial or technological) were not available among 2006 – 2011 to complete the short – term goal in the set deadline.

Review of the Plan implementation took place in the meetings of the Council of the National Centre and when performing a critical review, it was concluded that transfer of tasks and feedback to the operational level is insufficient in a number of cases. A difference in approach was also observed in various departments of the MoE and in other ministries/stakeholders involved.

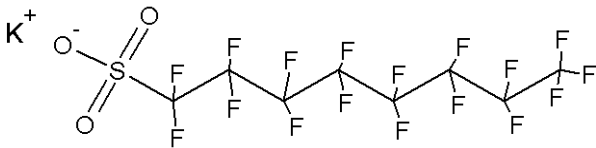
Should the implementation of the updated Plan be more successful than in its preceding period, it is necessary to eliminate discrepancies. The Council lacks, in particular, rigorous control of implementation of set activities, procedure/reminders to provide reports and feedback by individual members/departments and ministries how they deal with individual tasks.

In conclusion, it is necessary to strengthen control mechanism and discipline in providing situation/progress reports in defined periods as well as in information flow within the MoE and other ministries. Proposal to improve current situation should be submitted by the National Centre. The Council should consider the proposal by the end of 2012.

ANNEX 1: BASIC CHARACTERISTICS AND PROPERTIES OF NEWLY INCLUDED POPS (REVIEWED CHEMICALS)

As a source of information for the preparation of profiles of newly listed POPs and candidate chemicals were used 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/>), relevant EU and the Czech Republic legislation including the Integrated Pollution Register (IPR) and the archives of the National Centre for persistent organic pollutants.

P1.1 Perfluorooctane Sulfonate (PFOS)

Perfluorooctane Sulfonate	
Chemical name (IUPAC)	Perfluorooctane Sulfonate (PFOS)
CAS No	PFOS, as an anion, does not have a specific CAS number. The parent sulfonic acid has a recognised CAS number (CAS No 1763 – 23 – 1). Some examples of its commercially important salts are listed below: Potassium salt (CAS No 2795 – 39 – 3) Diethanolamine salt (CAS No 70225 – 14 – 8) Ammonium salt (CAS No 29081 – 56 – 9) Lithium salt (CAS No 29457 – 72 – 5)
EINECS No	
Molecular weight	538 g/mol
Structural Formula	
Water solubility	519 mg/L (20 ± 0,5°C), 680 mg/L (24 – 25°C)
Log K _{ow}	No data
Melting Point	> 400 °C
Boiling Point	No data
Vapour Pressure	3,31 x 10 ⁻⁴ Pa
Henry's Law Constant	3,09 x 10 ⁻⁹ Pa m ³ mol ⁻¹

Sources

PFOS is a fully fluorinated anion, which is commonly used as a salt or incorporated into larger polymers. PFOS and its closely related compounds, which contain PFOS impurities or substances which can give rise to PFOS, are members of the large family of perfluoroalkyl sulfonate substances. In its regulatory measures on PFOS, the EU has addressed all molecules having the following molecular formula: C₈F₁₇SO₂Y, where Y = OH, metal or other salt, halide, amide and other derivatives including polymers (European Union 2006).

PFOS can be formed (by environmental microbial degradation or by metabolism in larger organisms) from PFOS – related substances, i.e., molecules containing the PFOS. Although the ultimate net contribution of individual PFOS – related substances to the environmental loadings of PFOS cannot be predicted readily, there is a potential that any molecule containing the PFOS moiety could be a precursor to PFOS.

The majority of PFOS – related substances are polymers of high molecular weights in which PFOS is only a fraction of the polymer and final product (OECD, 2002). PFOS – related substances have been defined somewhat differently in different contexts and there are currently a number of lists of PFOS – related substances (Table 3). The lists contain varying numbers of PFOS – related substances that are thought to have the potential to break down to PFOS. The lists overlap to varying extents depending on the substances under consideration and the overlap between national lists of existing chemicals.

The main production process of PFOS and PFOS – related substances is electro – chemical fluorination, utilized by 3M, the major global producer of PFOS and PFOS – related substances prior to 2000.

The historical use of PFOS – related substances in the following applications has been confirmed in the US and the EU: fire fighting foams, carpets, leather/apparel, textiles/upholstery, paper and packaging, coatings and coating additives, industrial and household cleaning products, pesticides and insecticides.

Environmental fate

There is to date very limited information regarding the emissions and pathways of PFOS to the environment. The occurrence of PFOS in the environment is a result of anthropogenic manufacturing and use, since PFOS is not a naturally occurring substance.

Releases of PFOS and its related substances are likely to occur during their whole life cycle. They can be released at their production, at their assembly into a commercial product, during the distribution and industrial or consumer use as well as from landfills and sewage treatment plants after the use of the products.

PFOS is extremely persistent. It does not hydrolyse, photolyse or biodegrade in any environmental condition tested.

Biodegradation of PFOS has been evaluated in a variety of tests. Aerobic biodegradation of PFOS has been tested in activated sewage sludge, sediment cultures and soil cultures in several studies. Anaerobic biodegradation has been tested in sewage sludge. None of the studies demonstrated any signs of biodegradation. The bioconcentration factor (BCF) in liver and plasma was estimated to be 2900 and 3100 (fish).

PFOS have the potential for biomagnification. Animals at higher trophic levels contain a higher concentration of those substances. This also applies to the Arctic predators.

For PFOS volatilization is not probably significant. Assumed transport in the atmosphere in the form of binding the particles due to their properties. Some precursors are more volatile. Their mechanism of degradation to PFOS is not well known.

Exposure

High levels of PFOS are in the area of their primary use or production. PFOS can be found in the atmosphere, water, soil and sediments in all living organisms. The highest level is in the food chain for fish – eating predators.

Hazard assessment for endpoints of concern

Acute, subchronic and chronic toxicity of PFOS has been shown on the laboratory animals. PFOS are mainly toxic to fish, invertebrates and algae.

Summary

PFOS is a synthetic substance of anthropogenic origin with no known natural occurrence. It can be concluded therefore that the presence of PFOS and its precursors in the environment are the result of anthropogenic activities and that PFOS found in remote areas far from possible sources has been brought there through long – range environmental transport. While PFOS related substances may be degraded to PFOS, PFOS itself is extremely persistent in all media and can bioaccumulate and biomagnify in mammals and piscivorous birds.

The voluntary phase out of PFOS production by the major producer in the USA led to a reduction in the current use of PFOS – related substances. However, it can be assumed that it is still produced in some countries and it continues to be used in many countries.

Legislation

OECD published a report entitled "Results of the 2006 survey on production and use of PFOS, PFAS, PFOA, PFCA, Their Related Substances and Products / Mixtures containing these Substances." Data of production of the compounds referred to in this report, or their import for processing of subject records in the database IUCLID (International Uniform Chemical Information database). Used chemicals register covered by REACH legislation for biocides, and other programs at the European Chemicals Agency – ECHA. From the list published in this report shows that the problem of production and further processing of any PFOS covers a total of 23 states. The Czech Republic is not listed above.

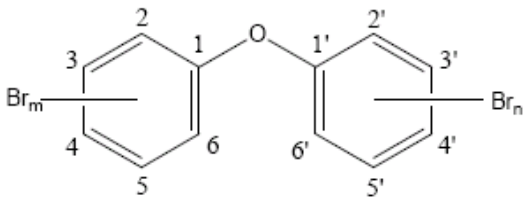
Directive 2006/122/EC of the European Parliament and of the Council and Directive 76/769/EEC.

Occurrence in the environment of the Czech Republic

According to the information based on the survey of the Institute of Chemical Technology (ICT) these substances have never been produced in the Czech Republic and are not manufactured. About their imports, occurs and consumption are no data in the Czech Republic for this reason.

These compounds were detected in the environment, however, are not available values. PFOS are not written to the IRP. Limits for water, air, soil, waste, food are not provided.

P1.2 Commercial octabromodiphenyl ether, hexabromodiphenyl ether and heptabromodiphenyl ether

octabromodiphenyl ether (OBDE)	
Chemical Name (IUPAC)	diphenyl ether, octabromo derivative
CAS No	32536 – 52 – 0
EINECS No	251 – 087 – 9
Molecular weight	801,5
Structural Formula	C ₁₂ H ₂ Br ₈ O
	
Water solubility	< 0,001 mg.L ⁻¹ , 20 – 30 g.L ⁻¹ at 25°C
Log K _{ow}	6.29 – 8.9
Melting Point	167 – 257 °C
Boiling Point	310 – 425 °C
Vapour pressure	6.6 x 10 ⁻⁸ – 4.7 x 10 ⁻⁷ Pa at 25°C
Henry's Law Constant	10.6 Pa.m ³ .mol ⁻¹

Sources

The information provided by the bromide industry indicates that the commercial product was produced in the Netherlands, France, USA, Japan, UK and Israel, but since 2004, it is no longer produced in the EU, USA and the Pacific Rim and there is no information that indicates it is being produced in developing countries.

In general, the polybrominated diphenyl ethers are used as flame retardants of the additive type. They are physically combined with the material being treated rather than chemically combined (as in reactive flame retardants). This means that there is the possibility that the flame retardant may diffuse out of the treated material to some extent. Industry indicates that octabromodiphenyl ether is always used in conjunction with antimony trioxide. In Europe, it is primarily used in acrylonitrile – butadiene – styrene (ABS) polymers at 12 – 18% weight loadings in the final product. Around 95% of the total octabromodiphenyl ether supplied in the EU is used in ABS.

Environmental Fate

No aerobic biodegradation of the hexa – to nonaBDEs is expected based on BIOWIN estimates as recalcitrant with respect to biodegradation, and no degradation, based on oxygen uptake, occurred in a 28 – day closed bottle test OECD 301D (EC, 2003).

The bioaccumulation potential differs strongly among the components of the commercial mixture.

Bioconcentration from water is considered relevant only for hexaBDE.

Bioaccumulation and biomagnification from food exposures – oral exposure is expected to be the most relevant exposure pathway for these chemicals.

A high potential for bioaccumulation (including a moderate potential for bioconcentration) and food – web biomagnification has been demonstrated for hexaBDE. The food – web biomagnification has been also demonstrated for heptaBDE, although at a lower extent than expected from the K_{ow}; this fact can be explained by metabolism resulting in a relatively short half – life.

The presence of components of commercial octaBDE in remote areas is considered the best demonstration for the potential for long range transport of these chemicals. As debromination in biota has been demonstrated, hypothetically, the presence of hexa to nonaBDE could be explained by a long range transport of decaBDE and its subsequent debromination, however, since hexa to deca congeners have similar atmospheric transport characteristics in terms of gas – partitioning and reactivity it is evidence of long range transport for decaBDE and is indirect evidence of long range transport for the nona to hexa congeners.

Exposure

C – octaBDE are globally widespread, in biotic and abiotic samples, in the atmosphere, soil, water and sediments.

Hazard assessment for endpoints of concern

There are very limited information regarding the hexa to nonaBDE to create toxic and ecotoxic profile for each isomer, mixture of isomers and commercial mixtures.

Specific information is for birds and mammals. Data concerning the mammals and aquatic organisms show the possible negative effect of lower brominated components in commercial mixture on the human body and some aquatic species. Toxicity to aquatic organisms is limited by their solubility in water and to other organisms is observed at high concentrations.

Summary

The evaluation of the human and environmental risk of commercial octaBDE associated to its potential for long range transport must consider that the commercial product is a mixture of components with different properties and profiles, which may also be released to the environment due to its presence as components of other PBDE commercial products and also produced in the environment by debromination of commercial decaBDE.

The persistence of the hexa to nonaBDE is well documented. The main route of degradation is debromination forming other BDEs, also of concern. The potential for certain components in c – octaBDE to bioaccumulate and also for biomagnification in some trophic chains is also sufficiently documented and confirmed by the good agreement between field observations in monitoring programmes and toxicokinetic studies. Monitoring data in remote areas confirm the potential for a long – range transport and at least for some congeners the relevance of atmospheric distribution in this process.

Legislation

See chapter “pentabromodiphenyl ether” (P1.4)

Occurrence in the environment of the Czech Republic

This compound is not produced in the Czech Republic. There are no available data about the importance and usage. Its incidence has been observed in other PBDE, see "Pentabromodiphenyl ether."

P1.3 Tetrabromodiphenyl ether

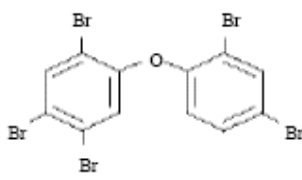
The compound is not produced separately, but is present in commercial mixtures with pentabromodiphenyl ether. For more information see chapter "Pentabromodiphenyl ether."

P1.4 Pentabromodiphenyl ether

Commercial pentabromodiphenyl ether (c – pentaBDE) refers to mixtures of bromodiphenyl ether congeners in which the main components are 2,2', 4,4' – tetrabromodiphenyl ether (BDE – 47 CAS No 40088 – 47 – 9) and 2,2',4,4',5 – pentabromodiphenyl ether (BDE – 99 CAS No 32534 – 81 – 9), which have the highest concentration by weight with respect to the other components of the mixture.

Sources

Commercial pentabromodiphenyl ether mixtures (c–pentaBDE) are used for flame retardant purposes as additives in consumer products. The commercial mixtures contain brominated diphenyl ether congeners with three to seven bromines in the molecule, but molecules with four and five bromines predominate. The proportion of the different polybromodiphenyl ether (PBDE) congeners in c–pentaBDE varies in different regions of the world.

Pentabromodiphenyl ether (PeBDE)	
Chemical Name (IUPAC)	Pentabromodiphenyl ether
CAS No	32534 – 81 – 9
EINECS No	251 – 084 – 2
Molecular weight	564,66
Formula	C ₁₂ H ₅ Br ₅ O
	
Water solubility	2.4 – 13.3 µg.L ⁻¹
Log K _{ow}	6.46 – 6.97
Melting Point	from – 7 till – 3 °C
Boiling Point	> 200 °C
Vapour pressure	1,55 x 10 ⁻⁶ – 7,76 x 10 ⁻⁶
Henry's Law Constant	0,36 Pa.m ³ .mol ⁻¹

The main source in North America and Western Europe has been the c-pentaBDE incorporated in polyurethane foam, used in domestic and public furniture. This use is now mainly phased out. The information is too limited to draw conclusions on the importance of other uses, like textiles, electrical and electronic products, building materials, vehicles, trains and aeroplanes, packaging, drilling oil fluid and rubber products. While some representative examples are covered, detailed information on use is lacking for many regions of the world.

EU stopped production this compound in 1997, it banned globally in 2004 and its use in electrical and electronic products were discontinued in 2006. In the U.S., no ban has been issued, but the U.S. production stopped voluntarily (California banned the use of overall since the beginning of 2008). These measures lead in these areas to concentrations decreased c-pentaBDE in the environment. The production of c-pentaBDE in China there is no information, but the use in electrical and electronic products here was forbidden by 1st May 2007. Technical pentaBDE mixture used in China has also represented other congeners.

Environmental fate

PentaBDE is released into the environment during the manufacture of the commercial product, in the manufacture of products containing pentaBDE, during their use and after they have been discarded as waste.

The major part of these substances ends up in soil. The main part of pentaBDE in the environment is bound to particles; only a small amount is transported in its gaseous phase or diluted in water.

Due to its high persistency in air, the main route for long – range transport of pentaBDE – as with so many substances that are sufficiently volatile, persistent and bioaccumulative – is through a series of deposition/volatilization hops towards the poles. Long – range transport through water and emigrating animals is also likely.

Exposure

Potential exposure to humans is through food, and through use of products and contact with indoor air and dust. PentaBDE transfers from mothers to embryos and lactating infants. A Canadian assessment of risk quotients suggests that the highest risks accrue to species high in the food chain. Information is lacking on the effects in humans of short – term and long – term exposure, although it is to be expected that vulnerable groups can be pregnant women, embryos and infants.

Considerably higher levels are found in humans from North America in general. About 5% of general populations have been found to be subjected to elevated exposure. This, together with the estimates of the long half – life of pentaBDE congeners in humans, raises concern for long – term effects on human health.

Based on the information in this risk profile, pentaBDE, due to the characteristics of its components, is likely, as a result of long – range environmental transport and demonstrated toxicity in a range of non – human species, to cause significant adverse effects on human health or the environment, such that global action is warranted.

Hazard assessment for endpoints of concern

PBDEs are especially dangerous to aquatic organisms (damaging reproductive function and growth of aquatic organisms). These compounds have significant potential to bioaccumulate.

Toxicity of brominated flame retardants has been demonstrated in numerous in vitro and in vivo studies. PBDEs are hazardous to human health. The immediate symptoms of exposure to PBDEs in humans include irritation of skin and eyes. PBDEs are stored in the body and can cause liver damage. The scientists have demonstrated effects of PBDEs on thyroid hormones in the blood.

A number of studies in rodents showed that diphenyl ethers (DEs) can interfere with the action of thyroid hormones. For workers professionally exposed to DEs was a higher incidence of thyroid hypofunction. Informations about the potential carcinogenicity are not entirely clear, but it has been shown that increased the likelihood of liver cancer in animals. Some of these compounds can also threaten the healthy development of the fetus.

For most toxic congeners are considered BDE – 47 and 99. Research on these compounds is limited; some studies have shown reproductive toxicity, neurotoxicity, and adverse effects on the endocrine system. BDE – 47 caused inhibition of growth and reproduction in plankton.

Summary

C-pentaBDE is a synthetic mixture of anthropogenic origin with no known natural occurrence. It can be concluded therefore that the presence of components of PFOS in the environment is the result of anthropogenic activities. Long range transport must be responsible for its presence in areas such as the Arctic region, remote from sites of production and release. PentaBDE degrades slowly in the environment and can bioaccumulate and biomagnify in mammals and piscivorous birds.

The phase out of c-pentaBDE production and use has led to a reduction in current use but many materials in use, such as polyurethane foams and plastics in electronic equipment, contain pentaBDE which is slowly released to the environment. This release will be accelerated at end – of – life of such materials, especially during recovery and recycling operations.

Although levels of pentaBDE in human blood and milk, and in other environmental species, are falling in Europe, they continue to increase in North America and the Arctic region.

Based on the information in this risk profile, c-pentaBDE, due to the characteristics of its components, is likely, as a result of long – range environmental transport and demonstrated toxicity in a range of non – human species, to cause significant adverse effects on human health and the environment, such that global action is warranted.

Legislation

PentaBDE is on the list of potential threatening compounds OSPAR Convention.

EU agreed with the wide ban on sale and use of penta – and octabrominated DEs. EU Regulation 2003/11/EC is prohibited trading and use of pentaBDE in concentrations higher than 0.1% wt since 2004.

The Directive on waste electrical and electronic equipment and the restriction of hazardous substances (WEEE / RoHS Directive) was also reached an agreement to end the use of PBDEs in electrical and electronic equipment by 2006 (ie Directive 2002/95/EC – RoHS, this is transposed into the national legislation amendment to the Act on Waste No 7/2005 Coll. to limit the application of certain hazardous substances in electrical and electronic equipment. The July 1, 2006 is prohibited from use in electrical and electronic equipment). Products containing more than 0.25% pentaBDE are classified as hazardous waste.

RoHS Directive 2002/95/EC, published in 2003, is implemented in the national legislation § 37j, paragraph (3) of the Waste Act (Act No 34/2008 Coll. Dated January 16, 2008, amending Act No 185 / 2001 Coll., on waste and amending some other Acts, as amended)

§ 37j, Act No 185/2001 Coll., On waste, as amended. Manufacturer of electrical equipment belonging to groups 1 – 7 according to Annex 7 to this Act, including electrical equipment intended solely for the purpose of national defense and manufacturer of electric lamps or luminaires intended for use household ensure that electrical, if placed on the market after 30th June 2006, does not contain lead, mercury, cadmium, hexavalent chromium, polybrominated biphenyls (PBBs) and polybrominated diphenyl ethers (PBDEs), except in the case of:

a) the use of substances as listed in the implementing regulation, or

b) spare parts for repair or reuse of electrical and electronic equipment put on the market before 1st July 2006.

Polybrominated diphenyl ethers are in the registry IPR. The reporting threshold for emissions into the air and transfers not specified, in water 1 kg/year to soil 1 kg/year, out of business reporting threshold 5 kg/year.

Due to the stability and tendency to bioaccumulate pentabrominated DEs was in the context of the EU Water (Water Framework Directive) designed their classification as "priority hazardous compound."

Occurrence in the environment of the Czech Republic

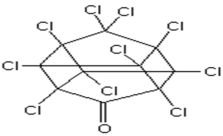
In the Czech Republic, this compound was never produced or manufactured (Information from Association of Chemical Industry). About the importance and use are no available informations.

PBDEs in the Czech Republic are monitored since 2001. Concentrations of PBDEs in fish and breast milk are measured, in 2003. PBDEs are detected in all samples, the main contributor is congener 47 (40% – 70% of the total BFRs) in most of the samples were detected also congeners BDE 99, BDE 100 and BDE 157. The mean concentration 1.46 ng/g fat in breast milk was lower than in Sweden (3.15 ng/g fat, 1998), but higher than in Japan (1.1 ng/g fat, 2000). In recent years, attention has also focused on BDE 209 (deca – BDE), which was not previously observed.

To determine the contamination of the aquatic ecosystem of the Czech Republic brominated flame retardants (PBDEs and HBCD) were implemented in the study (ICT) in which were collected the sediments from several selected sites in Czech rivers (Bílina, Ohře) and Moravian rivers (Moravia, Bečva Svitava, Jihlava, Dyje). There were detected 11 major PBDE congeners (28, 47, 49, 66, 85, 99, 100, 153, 154, 183 and 209) and HBCD.

A comparison of the representation of PBDE congeners, it is clear that the majority were at monitored sites present BDE 47, 99 and 183. A separate chapter is congener BDE 209, which was dominant in most samples, and the proportion may be as much as 96% of the overall findings observed BDEs.

P1.5 Chlordecone

chlordecone	
Chemical Name (IUPAC)	perchloropentacyclo[5.3.0.0 ^{2,6} .0 ^{3,9} .0 ^{4,8}]decan – 5 – one
CAS No	143 – 50 – 0
EINECS No	
Molecular weight	490.6 g/mol
Formula	C ₁₀ Cl ₁₀ O ₁
	
Water solubility	0.35 – 1 µg/L
Log K _{ow}	4.50, resp.5.41 Pa (25 °C)
Melting Point	350; (decomposes)
Boiling Point	No data
Vapour pressure	3.0x10 ⁻⁵ (25 °C), < 4.0x10 ⁻⁵ (25 °C), 4.0x10 ⁻⁵ (25 °C) mg/L
Henry's Law Constant	5.45x10 ⁻³ /25 °C, 2.53x10 ⁻³ /20 °C, 4.9x10 ⁻³ , 2.0x10 ⁻² Pa m ³ mol ⁻¹ /25°C

Sources

Chlordecone is a synthetic chlorinated organic compound, which has mainly been used as an agricultural insecticide, miticide and fungicide. It was first produced in 1951 and introduced commercially in the United States in 1958 (trade names Kepone® and GC – 1189). It was available in the United States until 1976. In France, chlordecone was marketed with a trade name Curlone from 1981 to 1993. Historically, chlordecone has been used in various parts of the world for the control of a wide range of pests. It has been used extensively in banana cultivation against banana root borer, as a fly larvicide, as a fungicide against apple scab and powdery mildew and to control the Colorado potato beetle, rust mite on non – bearing citrus, and potato and tobacco wireworm on gladioli and other plants. Given the specific pesticidal uses of chlordecone, it can be expected that all amounts manufactured are ultimately released to the environment.

Environmental fate

Chlordecone is not expected to hydrolyse or biodegrade in aquatic environments, nor in soil. Direct photodegradation is not significant. Therefore, chlordecone is considered to be highly persistent in the environment. With BCF – values in algae up to 6,000, in invertebrates up to 21,600 and in fish up to 60,200 and documented examples of biomagnification, chlordecone is considered to have a high potential for

bioaccumulation and biomagnification. The available data are not conclusive when it comes to long – range atmospheric transport of chlordecone in gaseous form. However, atmospheric transport of particle – bound substances and transport of sediment particles in ocean currents as well as biotic transport could also contribute to long – range environmental transport of chlordecone. Due to lack of monitoring data on chlordecone, the assessment of the potential for long – range transport of chlordecone was based on physico – chemical properties and application of long range transport models.

Exposure

The available information regarding environmental concentrations of chlordecone is very limited and includes only areas in the vicinity of production (US) or use (Martinique).

Hazard assessment for endpoints of concern

Chlordecone is absorbed into organisms and a longer exposure of this compound leads to its bioaccumulation. A pesticide is acutely and chronically toxic (neurotoxic, immunotoxic, reproductive toxicity, musculoskeletal toxicity). IARC classified this compound in Group 2B as a possibly carcinogenic. Chlordecone is very toxic to aquatic organisms. The most sensitive organisms are invertebrates.

Summary

Production and use of chlordecone was stopped in the eighties of the last century, in the areas of Martinique and Guadeloupe was used until 1993. It can not be excluded the use or production in developing countries, although for this fact is no information. During use as a pesticide gets directly into the environment. Due to the high persistence of the compounds may still be contaminated the place where it was used and the compound can still released into the environment. No data are available on concentrations of this compound in the remote areas of resources, although based on the chemical and physical properties can be expected transfer its remote particles in water and air. Because this compound is not produced nor used for many years, there are no comments related to this field, and no problems with potential socio – economic impact. Adding of this compound in Annex A (SC) can be used without any exemption, i.e. total ban on production and use. This will improve the evidence of available inventory on waste and waste management, or information, transport, prevention of production.

Chlordecone may arise as a degradation product of certain similar substances. Because chlordecone is stable in soil is also a problem with contaminated soil. Still commonly used techniques such as solvent extraction and incineration are expensive, almost microbial degradation does not take place and leads to products similar as the original compound. Phytoremediation techniques are promising, but require a long period of time.

Legislation

Annex I CLRTAP: stop the production and use of chlordecone

OSPAR: chlordecone is on the list of chemicals of potential danger

HELCOM Convention: the list of chemicals for immediate priority action (Recc. 19/5, Att.App 3) and component elimination plan (Annex I, Part 2)

The Basel Convention: a group of unused pesticides – see Annex 8 of the Convention: aldrin, chlordane, dieldrin, endrin, heptachlor, hexachlorobenzene, mirex, toxaphene, polychlorinated biphenyls (PCBs), DDT, chlordecone, polychlorinated dibenzo – p – dioxins and dibenzofurans (PCDDs/ PCDFs), the sum of alpha – , beta – and gamma HCH, hexabromobiphenyl)

Annex I to the Regulation of the European Parliament and Council Regulation (EC) No 850/2004 on persistent organic pollutants: total ban on production and use.

Commission Regulation (EC) No 323/2007 of 26/3/2007 amending Annex V of Regulation EC No 850/2004 on persistent organic pollutants and amending Directive 79/117/EEC.

Council Regulation (EC) No 172/2007 of 16/2/2007 amending Annex V of the European Parliament and Council Regulation (EC) No 850/2004 on persistent organic pollutants – the maximum concentrations of POPs in waste and their management.

Commission Decision (EC) No 2007/639/EC of 2/10/2007, uniform format for communicating data and information of the European Parliament and Council Regulation (EC) No 850/2004 on persistent organic pollutants.

Council Regulation (EC) No 1195/2006 of 18/7/2006 amending Annex IV of Regulation of the European Parliament and Council Regulation (EC) No 850/2004 on persistent organic pollutants – minimum concentrations of POPs in waste

Regulation No 850/2004 Coll. on the persistent organic pollutants. For concentrations in the atmosphere is no limit. For water ordinance applies No 252/2004 Coll. as amended by Decree No 187/2005 Coll., which lays down the health requirements for drinking water, ie 0.1 µg/L (maximum limit value (MLV) for pesticidal substance (single) (Decree No 252/2004 Coll.) 0.5 µg/L (maximum limit value (MLV) for the sum of pesticides (Decree No 252/2004 Coll.). Standard defines the maximum limit for pesticide substances and their sum. Decree 275/2004 Coll. lays down the health requirements for bottled water for pesticidal substances for each separately is a limit of 0.025 µg/L. the limits for groundwater by Methodical Instruction MoE (MoE Bulletin 3/1996) for a single organic chlorinated pesticides in µg/L: A = 0.01, B = 0.1 C = 0.2.

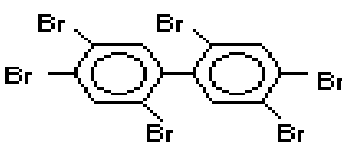
Explanatory notes to the limits of the Methodological MoE, 1996: Exceeding the limits of category A in soil (and groundwater), according to the Methodological MoE as of 3rd July 1996 evaluated as pollution relevant environmental components except for areas with naturally higher levels of controlled substances. Exceeding the limits B is considered as pollution, which can have a negative impact on human health and the individual components of the environment, and which requires further action. Exceeding the limits C represents pollution which may represent a major risk to human health and environmental components. Exceeding the limit C also requires decontamination area for the purpose.

Occurrence in the environment of the Czech Republic

Chlordecone has never been used and registered as a pesticide in the Czech Republic. Available information on the occurrence of: water (surface) – 1 – Chlorodecane (was measured in 36 sections): 0.37 ng/L (Elbe, Lysa nad Labem, December 15, 2001 and Elbe, Valy, January 9, 2002), but in some cases, measurements on other profiles and other day was also 1.5 ng /L. 1 – Chlorododecane was measured in 15 sections at the end of 2002 and the first third of 2002, never exceed the limit of quantification, which was 2 ng/L (source: CHMI)

Suspended sediments: monitoring was performed only once in four profiles in 2001 (Elbe – Valy, Decin Elbe, Odra – Bohumín, Jizera – Tuřice). All values were below the detection limit of 4 ng/g. 11 samples of subsurface waters were analyzed in 2002. The values of 1 – chlorodecane and 1 – chlorododecane never exceeded the limit of quantification (Source: MoE 2004).

P1.6 Hexabromobiphenyl

hexabromobiphenyl	
Chemical Name (IUPAC)	
Chemical Name (CAS)	Hexabromo – 1,1' – biphenyl
CAS No	6355 – 01 – 8
EINECS No	
Molecular weight	627.58 g/mol
Formula	C ₁₂ H ₄ Br ₆
	
Water solubility	11.3 µg/L
Log K _{ow}	6.39 (25 °C)
Log K _{oc}	3.33 – 3.87
Melting Point	72° C
Boiling Point	No data
Vapour pressure	6.9*10 ⁻⁶ Pa (25° C)
Henry's Law Constant	3.95*10 ⁻¹ , 1.40*10 ⁻¹ Pa m ³ mol ⁻¹

Sources

Hexabromobiphenyl belongs to a wider group of polybrominated biphenyls (PBBs). The term “polybrominated biphenyls” or “polybromobiphenyls” refers to a group of brominated hydrocarbons formed by substituting hydrogen with bromine in biphenyl. The hexabromo congeners exist as 42 possible isomeric forms. According to

the available data, production and use of hexabromobiphenyl has ceased in most, if not all, countries. However, it is possible that hexabromobiphenyl is still being produced in some countries.

Hexabromobiphenyl has been used as a fire retardant in acrylonitrile– butadiene – styrene (ABS) thermoplastics for constructing business, machine housings and in industrial and electrical products and in polyurethane foam for car's upholstery. A considerable part of the substance produced will probably reach the environment sooner or later because of the high stability of these compounds.

Production took place in the U.S. between 1970 and 1975, polybrominated biphenyls were produced in the UK (until 1977), Germany (until 1985) and in France (till 2000). It is expected that today is no longer manufactured anywhere. It is possible to use only in some developing countries.

Into the environment, this compound can get out of the products in which it is contained. The combustion also generates toxic polybromid dibenzofurans.

Environmental fate

According to available data, hexabromobiphenyl can be considered as highly persistent in the environment. There is evidence of low or no degradation in water, soil and sediment, in the laboratory as well as in the field.

Hexabromobiphenyl is less volatile than many of the currently listed POP substances. However, extensive data on monitoring shows that it is found throughout the Arctic wildlife, demonstrating that it does have a high potential for long range environmental transport.

With measured weight – based BCF values in the range 4,700 – 18,100 and biomagnification factors in the aquatic food chain exceeding 100, hexabromobiphenyl is considered to be highly bioaccumulative and to have a high potential for biomagnification. These properties are demonstrated by several authors to be comparable to those of hexachlorobiphenyl (a PCB compound), for which the bioaccumulative properties are well documented.

Hexabromobiphenyl is less volatile than any existing POP; its presence is confirmed in the whole Arctic region. It can therefore be assumed its ability to long – term transport.

Exposure

Hexabromobiphenyl can be released into the environment during the use of the product in which it is contained, and last but not least at their disposal. But it must be emphasized that the PBB compounds are volatile and slightly soluble, so their main source of leakage is dust or particles generated from the product. At present, the exposure to these substances is very low because they are not being manufactured and used anymore. Population may be exposed from previous loads.

Hazard assessment for endpoints of concern

Hexabromobiphenyl is readily absorbed into the body and accumulates following prolonged exposure. Although the acute toxicity of hexabromobiphenyl is low, a number of chronic toxic effects including hepatotoxicity have been observed in experimental animals (rats). The IARC has classified hexabromobiphenyl as a possible human carcinogen (IARC group 2B). The PBBs are endocrine disrupting chemicals, and effects are seen on reproductive capacity in rats, minks and monkeys. There is epidemiological evidence of hypothyroidism in workers exposed to polybrominated biphenyls and of increased incidence of breast cancer in exposed women. Data on toxicity to other species than laboratory mammals is scarce but suggests the environmental toxicity of hexabromobiphenyl is comparable to that of hexachlorobiphenyl.

Summary

Hexabromobiphenyl is persistent, is subject to bioaccumulation and biomagnification. It can be transported to long distances. It is a possible carcinogen and has an adverse effect on the endocrine system. The production of this compound is stopped, but it is possible to renew it.

HBB production was stopped many years ago, at this time already used other alternative compounds that are more or equally harmful as HBB. Products in which the compound were used, should life between 5 – 10 years, so most of them are in landfills or were burned. Besides this problem with HBB, exists the possibility with repeated recycling of these products especially in Asian countries with potential or existing stocks of these products, respectively, somewhere maybe produced.

Legislation

Annex I CLRTAP: stop the production and use of HBB

The Rotterdam Convention

OSPAR Convention: brominated flame retardants are on the list of chemicals for priority action

HELCOM Convention: HBB is on the list of chemicals for immediate priority action (AM 19/5, App 3) and component for elimination plan (Annex I, Part 2)

The Basel Convention: HBB is in Annex VIII.

Annex I, Regulation of the European Parliament and Council Regulation (EC) No 850/2004 on persistent organic pollutants: total ban on production and use.

Directive 2002/96/EC (WEEE) Waste Electrical and Electronic Equipment (WEEE) requires the elimination of brominated flame retardants from WEEE prior to further handling

Directive 2002/95/EC (RoHS) to limit the application of certain hazardous substances in electrical and electronic equipment

Directive 1195/2006/EC, which amends Regulation 850/2004/EC: the POPs (also HBB) in the waste must be disposed of in the case that they exceed the concentration limit of 50 mg/kg

Directive 1976/769/EEC ban PBBS in textile products.

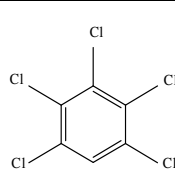
RoHS Directive 2002/95/EC published in 2003, is implemented into national legislation § 37j, paragraph (3) of the Waste – Act No 34/2008 Coll. of 16 January 2008 amending Act No 185/2001 Coll., on waste and amending some other Acts, as amended

Hexabromobiphenyl in IPR (European Parliament and Council Regulation No 166/2006 of 18 January 2006 establishing a European register of releases and transfers of pollutants and amending Council Directives 91/689/EEC and 96/61/EC Annex II). The threshold values for releases to air 0.1 kg/year in water 0.1 kg/year to soil 0.1 kg/year threshold for wastewater přenosyv 0.1 kg/year.

Occurrence in the Environment of the Czech Republic

Hexabromobiphenyl has never been used in the Czech Republic and has never been registered as a pesticide. No data are available about values occurred in the Czech Republic.

P1.7 Pentachlorobenzene

Pentachlorobenzene (PeCB)	
Chemical Name (IUPAC)	pentachlorobenzene
CAS No	608 – 93 – 5
EINECS No	210 – 172 – 0
Abbreviation	PeCB, PeCB
Molecular weight	250,32
Formula	C ₆ HCl ₅
	
Water solubility	0,56 mg.l ⁻¹ /20 °C
Log K _{ow}	4,8 – 5,18
Melting Point	86 °C
Boiling Point	277 °C
Vapour pressure	2,2 Pa/25 °C
Henry's Law Constant	71,9 Pa m ³ .mol ⁻¹

Sources

Past uses of PeCB are PeCB as a component in PCB products, in dyestuff carriers, as a fungicide and a flame retardant and as a chemical intermediate e.g. for the production of quintozene. Major U.S. and European manufacturers of quintozene have changed their manufacturing process to eliminate this use of PeCB. PeCB is also present at low levels as an impurity in several herbicides, pesticides and fungicides. In the United States, some pesticide manufacturers have changed their manufacturing processes to reduce the concentration of HCB

impurities in their products, and these changes may have reduced concentrations of PeCB contaminants also. PeCB is also a low level degradation product of some pesticides. Literature sources show that PeCB is of no commercial significance. No trade or stockpiles have been reported.

Nowadays PeCB enters the environment through various sources of which PeCB as a byproduct of incomplete combustion is the largest current source. However, there is considerable uncertainty on the release of PeCB by various sources and available data are limited to the United States and Canada.

Environmental fate

The limited data available makes it difficult to provide a proper global estimate on amounts and trends. Total estimated annual global emissions of PeCBs based on the US – TRI database were 85.000 kg/yr.

PeCB should be considered as persistent given the estimated and experimental half lives in atmosphere, soils, sediments, and water. According to the available data PeCB has a high bioaccumulation potential. Log K_{ow} values vary between 4.88 and 6.12, with recommended values of 5.17 – 5.18. BCF values range from 1085 – 23000 L/kg for fish, 833 – 4300 L/kg for mollusca, and 577 – 2258 L/kg for crustacea. Due to the fact that biotransformation of PeCB will be insignificant and the substance is very hydrophobic, the compound may also have a high biomagnification potential.

PeCB is moderately toxic to humans and is not classified as a carcinogen. Within the EU PeCB is classified as a substance which is very toxic to aquatic organisms (LC_{50} for fish, daphnia or algae ≤ 1 mg/L). Limited data are available on terrestrial ecotoxicity and data for toxicity to birds are lacking.

Physical and chemical characteristics, such as water solubility, vapour pressure and Henry's Law Constant, are within the range of the other POPs. PeCB can be photo – oxidized in the atmosphere, largely through reactions with hydroxyl (OH) radicals. However, estimated half – lives of PeCB in air of 45 to 467 days were reported. Considering its physical and chemical characteristics and persistence in air, PeCB has a potential for long range transport through the atmosphere. This is supported by the presence of PeCB in environmental compartments, including biota, from remote regions.

PeCB is spread widely in the environment on a global scale. Measured levels of PeCB in abiotic and biotic media in remote regions such as the (ant) arctic environment are available, as well as monitoring data on PeCB in abiotic and biotic media of temperate zones. In general, data from developed countries indicates that concentrations of PeCB in the temperate zones of the world seem to decrease. For the (ant)arctic area, only recent data are available which do not allow to derive a trend.

Based on the available evidence, PeCB is likely, as result of its long range environmental transport, to lead to significant adverse human health and/or environmental effects, such that global action is warranted.

Exposure

PeCB are available worldwide in biotic and abiotic samples, in the atmosphere, soil, water and sediments. Man may come into contact with this compound from the air, drinking water and food.

Hazard assessment for endpoints of concern

Adverse effects have been described for humans. Acute exposure is characterized hepatitic, nefric, hematologic, and developmental toxicity. PeCB is not classified as a carcinogen. It is moderately toxic to humans and highly toxic for aquatic organisms. Data for the organisms in the soil and sediments are inadequate or missing.

Summary

The data relating to biomagnificence and bioavailability can not derive any conclusions because they are not complete or quantitative or controversial. Overall PeCB concentrations in the environment are decreasing. Production in Europe and North America has been stopped. In the other areas there is only limited information available. The release of this substance as a by – product of combustion is probably the most important source of it in the environment.

Legislation

Pentachlorobenzene is in Annex 1 of Act No 254/2001 Coll. on waters, as amended, listed as a hazardous substance abuse: (organohalogen compounds and substances). Emission limits for pentachlorobenzene in the water are not regulated by legislation. The emission standards are regulated by Government Regulation No 61/2003 Coll. The value of acceptable pollution of surface waters for PeCB is 0.2 mg/L.

Limits for groundwater by Methodical instruction MoE (MoE Bulletin 3/1996) for pentachlorobenzene in $\mu\text{g/L}$: A = 0.01, B = 0.5, C = 1. Explanatory notes to the limits of instruction, please refer to chapter "Chlordecone".

Limits for soils under Methodical instruction MoE (MoE Bulletin 3/1996) for chlorobenzenes (individually) in mg/kg dry weight: A = 0.05, B = 2.5, C (habitable) = 3 and C (average) = 10.

Occurrence in the environment of the Czech Republic

This compound is not produced in the Czech Republic, although it is assumed that it is used, but are not available details. In the Czech Republic is detected (TOCOEN).

The highest values of pentachlorobenzene in sediments and suspended solids were found in the profile of the river Bílina in Ústí nad Labem. The source of this contamination is most likely chemical plant Spolchemi.e.

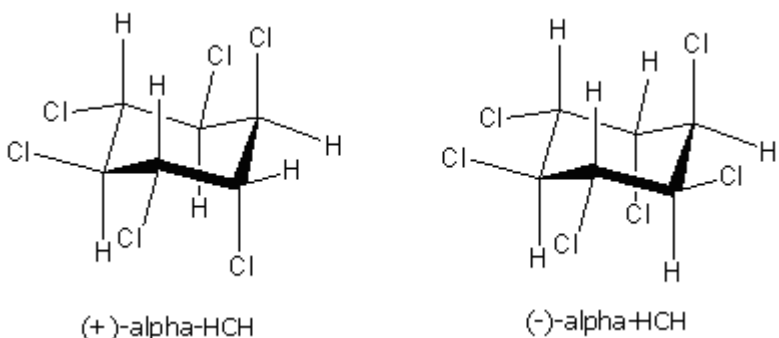
Measurement results of pentachlorobenzene in aquatic ecosystems summarize report of the MoE from 2004:

Water: From the 73 profiles were collected 1078 samples. 85% were below the detection limit. Values were in the range from 1.0 ng/L to 28.6 ng/L . The highest concentration was measured on the profile of the river Svratka in Židlochovice.

Suspended sediments: Pentachlorobenzene suspended solids is monitored from 2001 on 44 profiles in total number of 192 measurements (82% of the values were below the detection limit). The average profile of concentration range from 0.5 to 70 $\mu\text{g/kg}$ (river Bílina in Ústí nad Labem). Most values are in cat A1 (background levels), only the profile Bílina in Ústí nad Labem was a slight contamination (Cat. A2).

Sediments: From the 44 profiles were obtained a total of 86 values. Range max concentrations ranged from 1 to 70 mg/kg . Of this, 43 profiles were in the range below 50 $\mu\text{g/kg}$, i.e. A1 and the remaining 1 river's profile Bílina in Ústí nad Labem, with a maximum of 70 $\mu\text{g/kg}$ cat belongs to A2.

P1.8 Alpha – hexachlorocyclohexane

Alpha – hexachlorocyclohexane	
Chemical Name (IUPAC)	(1a,2a,3b,4a,5b,6b) – Hexachlorocyclohexane
Chemical Name (CAS)	
CAS No	Racemic: 319 – 85 – 6, (+) alpha HCH: 11991169 – 2, (–) alpha HCH: 119911 – 70 – 5
EINECS No	206 – 270 – 8
Molecular weight	290.83
Formula	$\text{C}_6\text{H}_6\text{Cl}_6$
	 <p>(+)-alpha-HCH (-)-alpha-HCH</p>
Water solubility	$17 \text{ mg}\cdot\text{L}^{-1}$ (24°C)
Log K_{ow}	3,8 (25°C)
Melting Point	112°C
Boiling Point	288 °C
Vapour pressure	0.25 Pa (25 °C)
Henry's Law Constant	$0.74 \text{ Pa m}^3 \text{ mol}^{-1}$

Sources

After almost forty years of extensive use worldwide, there has been a gradual replacement of technical hexachlorocyclohexane (HCH) by lindane (gamma HCH). No significant uses of technical HCH have been

reported after 2000. However, releases into the environment may also occur from lindane production as well as from hazardous waste sites, landfills and contaminated sites. Because of its hazard profile and widespread abundance, technical HCH (including alpha HCH as the main isomer) is subject to national and international regulations and prohibitions.

Alpha -HCH is a part of the technical HCH mixture (alpha -HCH (55 – 80%), beta HCH (5 – 14%), gamma-HCH (8 – 15%), delta – HCH (6 – 10%) and epsilon- HCH (1 – 5%)), used as chlorinated insecticides or for the production of lindane (gamma HCH). There is no known manufacturer of this mixture. However, approximately 2,785 tons of technical HCH and 45 tons unspecified HCH is saved in Africa and Middle East. Overall, there was 10 million tons of technical HCH used between 1948 and 1997, out of approximately half from China, followed by the former Soviet Union, India, France, Egypt, Japan, USA, the former East Germany, Spain and Mexico. Previously, HCH was getting into the environment during their production and use, today it is possible leaks from inventories and waste dumps and possible uncontrolled production of lindane.

Environmental fate

Alpha HCH shall be subject of hydrolysis and photolysis. Degradation is slow particularly at lower temperatures. Biotic degradation takes place both under aerobic and anaerobic conditions. Overall, its speed depends on climatic conditions, soil properties, organic matter, moisture, pH and bacterial growth. Abiotic processes are not enantioselective but biodegradation may be.

K_{ow} coefficient has a value of 3.8, indicating a potential for bioaccumulation, but its value is below 5 (as established in Annex D of Section 1 (c) (i) of the Stockholm Convention). BCFs values were determined for a number of organisms.

High concentrations of alpha HCH have been found in the Arctic biota, due to its bioaccumulation potential, and by earlier deposition of the compound. It is a combination of properties of the compounds, and low temperatures.

Technical HCH is subject to long – distance transport. It was detected in the water and the atmosphere of the Arctic and Antarctic regions. This follows from the physico – chemical properties and stability of compounds. In addition, it is assumed that alpha HCH can accumulate in cold water due to the low value of Henry's constant and create reservoirs.

Exposure in the Arctic and Antarctic regions

Exposure to these compounds is based on their use and manufacture. People are exposed to these substances in the enjoyment of contaminated food. Receipt through breathing and drinking water is not so significant. Significant intake from environmental biota demonstrates bioavailability.

Hazard assessment for endpoints of concern

Compared with the technical mixture of HCH and lindane, alpha HCH has limited data available. There are no studies on the toxicity of alpha HCH dermal application and breathing on animals. Similarly, there are no data on developmental, teratogenic and reproductive effects.

Alpha HCH is neurotoxic, hepatotoxic agent with immunosuppressive effects. Classified by IARC as Group 2B, i.e. potentially carcinogenic. Several studies indicate the possibility of the influence of this compound on the breast cancer. Adverse human health effects are manifested primarily in the contaminated areas such as in the Arctic.

Summary

Most countries have banned or restricted the use of technical HCH as a pesticide, replacement by lindane. Lindane production is equally large source of these compounds, as existing stocks. However, there was a dramatic decrease in the release of HCH in the environment over the last 30 years, alpha HCH, however, due to their persistence in nature is still at low levels persists. The main barrier to rapid degradation in the Arctic region is the low water temperature.

Alpha-HCH is present in all food chains.

Legislation

Hexachlorocyclohexane, according to Decree No 201/2012 Coll. is assigned to other persistent chlorinated organic compounds (group of substances 3.4), for which the general emission limit is specified in the following way: "Do not exceed the total mass concentration of these pollutants 0.2 mg/m³ after conversion to standard state conditions. In the shortest time is necessary to eliminate these substances from emissions into the ambient air. "

For drinking water is the highest limit for pesticidal substances 0.1mg /L (Decree of the Ministry of Health No 376/2000 Coll.).

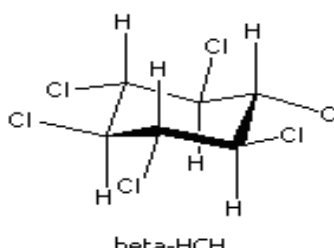
Limits for groundwater by Methodical instruction MoE (MoE Bulletin 3/1996) for a single organic chlorinated pesticides in µg/L: A = 0.01, B = 0.1 C = 0.2. Explanatory notes to the limits of instruction, please refer to chapter "Chlordecone". Decree No 13/1994 Coll. sets limit values for chlorinated organic pesticides in soils, individual: 0.01 mg /kg of dry matter. Total (sum of all chlorinated organic pesticides: 0.1 mg/kg of dry matter.

Limits for soils under Methodical instruction MoE (MoE Bulletin 3/1996) for a single organic chlorinated pesticides in mg/kg dry weight: A = 0.05, B = 2, C (habitable) = 2.5 and C (average) = 10.

Occurrence in the environment of the Czech Republic

Exposure of the population by alpha, beta, and delta – HCH isomer is detected since 1994. Detailed information on monitoring are listed in publications of the National Health Institute in Prague, describing the dietary exposure of humans in the Czech Republic (Ruprich etc., from 1995 to 2002). In the soils was HCH detected at concentrations of 0.02 – 356 ng/g dry weight.

P1.9 Beta – hexachlorocyclohexane

Beta – hexachlorocyclohexane	
Chemical Name (IUPAC)	(1 – alpha, 2 – beta, 3 – alpha, 4 – beta, 5 – alpha, 6 – beta) – Hexachlorocyclohexane
CAS No	319 – 85 – 7
EINECS No	206 – 271 – 3
Molecular weight	290,83
Formula	C ₆ H ₆ Cl ₆
	 <p>beta-HCH</p>
Water solubility	5 ppm
Log K _{ow}	3,78
Melting Point	314 – 315
Boiling Point	60
Vapour pressure	0,053 Pa (25 °C)
Henry's Law Constant	0,037 Pa m ³ mol ⁻¹

Sources

After almost forty years of extensive use worldwide, there has been a gradual replacement of technical hexachlorocyclohexane (HCH) by lindane (gamma HCH). No significant uses of technical HCH have been reported after 2000. However releases into the environment may also occur from lindane production as well as from hazardous waste sites, landfills and contaminated sites. Because of its hazard profile and widespread abundance, technical HCH (including beta HCH) is subject to national and international regulations and prohibitions.

Environmental fate

Abiotic degradation processes do not play an important role in the fate of beta HCH in the environment. Thus photolysis and hydrolysis are not significant. Under favourable conditions, beta HCH is susceptible to biodegradation. However, compared to the gamma – and alpha HCH, it is the most recalcitrant isomer.

Laboratory and field data including a long – term soil study suggest that beta HCH is persistent in soil, especially under low temperatures. It is mainly associated with particles and has a low leaching potential.

Beta HCH exposure levels in local areas have declined after worldwide prohibitions and restrictions. However regions with recent exposure and/or high pollution can still show elevated levels. A special concern also arises from exposure of hazardous waste sites and dumping grounds from disposed beta HCH residues from lindane production. Due to its persistence, beta HCH can still be detected at low background levels in all environmental media except in regions with recent usage and/or high pollution. Data from the abiotic environment in the Arctic are scarce, partly due to low levels compared with the other HCH isomers. In contrast to this fact, fairly high concentrations in Arctic biota including marine mammals and birds were detected with increasing levels.

Beta HCH is present in terrestrial and aquatic food chains. Beta HCH may bioaccumulate and biomagnify in biota and Arctic food webs, especially in upper trophic levels. In humans, accumulation in fat tissue and high concentrations in blood and breast milk may occur. Beta HCH transfers from mothers to embryos and nursing infants. The physico – chemical properties of beta HCH allow the dispersal of the substance from its sources to the Arctic mainly by long – range environmental transport via ocean currents. Beta HCH has been detected in the Arctic Ocean and is present in marine, terrestrial species, and humans.

Exposure

Human exposure to beta HCH results mostly from ingestion of contaminated plants, animals and animal products. High exposure is expected in contaminated areas due to extensive use, former production, disposal sites and stockpiles.

Given the hazard profile and the exposure levels in the environment including the food chain, it can be concluded that beta HCH may adversely affect wildlife and human health in contaminated and remote regions including the Arctic region. Arctic public health authorities believe the significant social, cultural and economic benefits of traditional foods outweigh the risks of contaminants such as HCH at present but give another reason for the quick control and elimination of all HCH isomers from traditional foods.

Based on the hazard profile, together with estimated daily intakes of beta HCH of Arctic indigenous people that exceeds safe intake reference values, and given the widespread occurrence of beta HCH in biota, including in remote areas far from likely sources, it is concluded that the substance is likely, as a result of its long – range environmental transport, to lead to significant adverse human health and environmental effects, such that global action is warranted.

Direct exposure of organisms is exposed during manufacture and use. The presence of beta HCH in the environment persists due to its persistence, so the higher exposure concentrations can be expected at sites where these pesticides are widely used produced or where they are stored. It is possible food exposure through contaminated plants, animals and products. Children are also exposed to sources of income from their mother at the embryo stage or during breastfeeding. Levels of local concentrations generally declined due to prohibitions and restrictions, yet their levels in some areas are high. The problem is the continuing lindane production.

Hazard assessment for endpoints of concern

Beta HCH is acutely toxic to aquatic organisms and shows estrogenic effects in fish. Reduced fitness of offspring in birds as well as reduced retinol concentrations in polar bears is associated with beta HCH and HCHs levels. Toxicological studies with beta HCH have demonstrated neurotoxicity and hepatotoxicity. Also, reproductive and immunosuppressive effects and effects on fertility were seen in laboratory animals. Beta HCH has been classified in group 2B as possibly carcinogenic to humans by the International Agency on Research and Cancer (IARC). Several epidemiological studies indicate that beta HCH might play a role in human breast cancer.

Summary

At present, the technical HCH is not in use but still can be a source of beta HCH into the environment. The amount of HCH isomers among others is a by – product of lindane and is estimated at 1.6 to 1.9 to 4.8 million tons. Beta HCH is a persistent pollutant, present in a number of environmental samples. It has negative effect on the organisms in contaminated areas as well as in the Arctic.

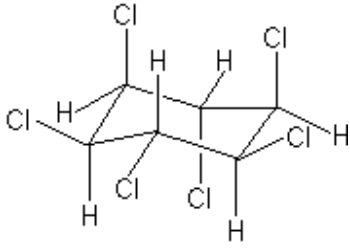
Legislation

See chapter “Alpha hexachlorocyclohexane”.

Occurrence in the Environment of the Czech Republic

See chapter “Alpha hexachlorocyclohexane”.

P1.10 Lindane

Lindane = γ -HCH	
Chemical Name (IUPAC)	gamma isomer 1,2,3,4,5,6 – hexachlorocyclohexane (HCH)
CAS No	58 – 89 – 9
EINECS No	200 – 401 – 2
Molecular weight	290.83
Formula	C ₆ H ₆ Cl ₆
	
Water solubility	7,3 (25°C); 6,8 g×m ⁻³
Log K _{ow}	4.10
Melting Point	112.5 °C
Boiling Point	323.4 °C (760 mmHg)
Vapour pressure	4.2×10 ⁻⁵ mmHg (20°C)
Henry's Law Constant	3.5×10 ⁻⁶ Pa m ³ mol ⁻¹ (25 °C)

Sources

For each ton of lindane produced, around 6 – 10 tons of other isomers are also obtained. In the last years the production of lindane has rapidly decreased and it appears that only Romania and India are current producing countries. Lindane has been used as a broad – spectrum insecticide for seed and soil treatment, foliar applications, tree and wood treatment and against ectoparasites in both veterinary and human applications.

Lindane is a chemical compound used as a broad – spectrum insecticide in agriculture and pharmacy. In the past, there was an extensive production of lindane in the 1950s and 1990s and was used until 2000 with 600,000 tons produced in total. Currently, the manufacturing industry indicates that new technology converted waste isomers to the hydrochloric acid and trichlorobenzene. Lindane was produced in Europe (including the Czech Republic), South America (Brazil, Argentina), North America (USA), Asia (China, India, Japan, Turkey, Azerbaijan) and Africa (Ghana).

At present, production continues in some countries (Romania, India and possibly Russia and China). Lindane is in some countries still applied in agriculture. The use of lindane on its territory stopped in total 17 countries. These include: Denmark, Finland, Gambia, Honduras, Indonesia, South Africa, South Korea, Colombia, Costa Rica, Kuwait, Hungary, Netherlands, New Zealand, Santa Lucia, Slovenia, Sweden and Turkey. Another 20 countries, including the Czech Republic, limited its use. The European Commission has banned the use of lindane in agriculture and horticulture.

Environmental fate

Once released into the environment, lindane can partition into all environmental media. Hydrolysis and photolysis are not considered as important degradation pathways and reported half – lives in air, water and soil are: 2.3 days, 3 – 300 days and up to 2 to 3 years, respectively. A half – life of 96 days in air has also been estimated.

Lindane can bio – accumulate easily in the food chain due to its high lipid solubility and can bio – concentrate rapidly in microorganisms, invertebrates, fish, birds and mammals. The bioconcentration factors in aquatic organisms under laboratory conditions ranged from approximately 10 up to 4220 under field conditions, the bioconcentration factors ranged from 10 up to 2600. Although lindane may bioconcentrate rapidly, bio – transformation, depuration and elimination are also relatively rapid, once exposure is eliminated.

Many studies have reported lindane residues throughout North America, the Arctic, Southern Asia, the Western Pacific, and Antarctica. HCH isomers, including lindane, are the most abundant and persistent organochlorine contaminants in the Arctic where they have not been used, pointing at evidence of their long – range transport.

The hypothesis that isomerization of gamma HCH to alpha HCH in air emerged as a possible explanation for higher than expected alpha HCH/gamma HCH ratios in the Arctic. However no conclusive experimental evidence of isomerization taking place in air has been produced to date. Also, although there is evidence that bioisomerization of lindane can take place through biological degradation; it seems that this process may play an insignificant role in the overall degradation of gamma HCH.

Exposure

Lindane can be found in all environmental compartments, and levels in air, water, soil sediment, aquatic and terrestrial organisms and food have been measured worldwide. Humans are therefore being exposed to lindane as demonstrated by detectable levels in human blood, human adipose tissue and human breast milk in different studies in diverse countries. Exposure of children and pregnant women to lindane are of particular concern.

Hazard assessment for endpoints of concern

Hepatotoxic, immunotoxic, reproductive and developmental effects have been reported for lindane in laboratory animals. The US EPA has classified lindane in the category of “Suggestive evidence of carcinogenicity, but not sufficient to assess human carcinogenic potential”. Lindane is highly toxic to aquatic organisms and moderately toxic to birds and mammals following acute exposures. Chronic effects to birds and mammals measured by reproduction studies show adverse effects at low levels such as reductions in egg production, growth and survival parameters in birds, and decreased body weight gain in mammals, with some effects indicative of endocrine disruption.

Summary

Lindane is persistent, bioaccumulative and toxic. Its toxicity is the same, and sometimes even higher than for previously described organochlorine contaminants. Toxic effect of its use against lice and scabies is rather caused by improper use. Lindane has been identified in environmental samples around the world, including human blood, human milk and adipose tissue of different stocks, which is representative of its long – range transport.

There are a number of alternative chemical compounds that can replace the use of lindane in agriculture. Compensation of lindane in pharmacy, where it is used against lice and scabies, is a problem, because the market is not efficient enough to substitute the products (USA, Canada).

Note: Czech Republic provides monitoring, cleaning contaminated sites (chemical plant Spolana) using BCD technology, the estimated price is 100 million Czech Crowns (4 million U.S. dollars).

Legislation

Annex II CLRTAP

Annex III of the Rotterdam Convention

OSPAR Convention: lindane is on the list of chemicals for priority action

Annex I to the Regulation of the European Parliament and Council Regulation (EC) No 850/2004/EC

on persistent organic pollutants: production and use of HCHs, including lindane, are subject to restrictions under the Protocol.

Directive 200/60/EC Water Framework Directive (Water Framework Directive)

1195/2006/ES Directive, which amends Regulation 850/2004/EC Annex IB and IV.

Exports of substances covered by the Convention (including lindane) are covered by the European Parliament and of the Council 304/2003/EC concerning the export and import of dangerous chemicals.

Government Regulation No 61/2003 Coll. Pollution standards: indicators and values of permissible pollution of surface water – 0.01 g / l Pollution standards represent permissible pollution of surface water flow in Q355, or the minimum guaranteed flow of water in the stream, or a value that is maintained, unless the annual number of samples non – compliant with this standard is greater than 5%. For drinking water is the highest limit for pesticidal substances 0.1 mg/L (Decree of the Ministry of Health No 376/2000 Coll.). Limits for groundwater by Methodical instruction MoE (MoE Bulletin 3/1996) for a single organic chlorinated pesticides in µg/L: A = 0.01, B = 0.1 and C = 0.2.

Decree No 13/1994 Coll. sets limit values for chlorinated organic pesticides in soils: individual: 0.01 mg/kg total solids (sum of all chlorinated organic pesticides): 0.1 mg/kg of dry matter. Limits for soils under Methodical

instruction MoE (MoE Bulletin 3/1996) for a single organic chlorinated pesticides in mg/kg dry weight: A = 0.05, B = 2, C (habitable) = 2.5 and C (average) = 10.

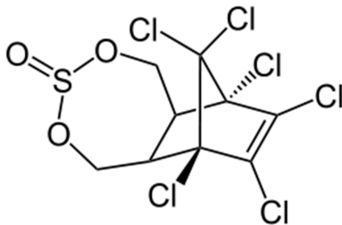
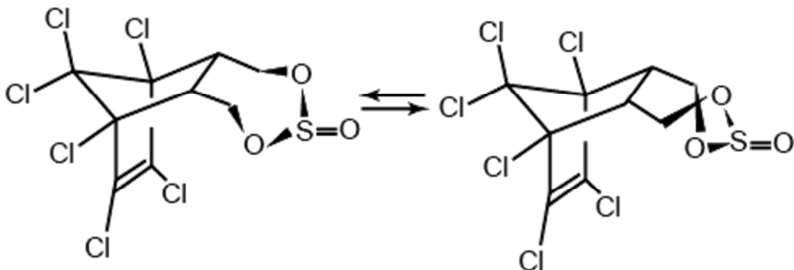
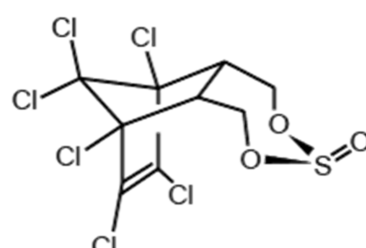
Integrated Pollution Register (Government Regulation No 368/2003 Coll.), Annex 2 with reporting obligations after the ratification of the PRTR Protocol to the Aarhus Convention, the Czech Republic: the reporting thresholds in kg/year for emissions to air = not determined for emissions to water = 1kg/year for emissions to soil = 1kg/year and transfers off – site = 1kg/per year.

Occurrence in the environment of the Czech Republic

Lindane is used as an insecticide in agriculture and for control of human and animal parasites and the treatment of forest stands in the Czech Republic. Higher concentrations of lindane were detected in Czech rivers in central and southern Moravia, but also in the river Bílina below the plant Spolchemie in Ústí nad Labem. Also in river sediments were measured higher values in river Moravia. Preliminary national inventory of POPs (Holoubek, I. et al. 2002) also saw a summary of the results of measurements of lindane in subsurface waters.

Monitoring by a team of authors report revealed values above the detection limit, or 2 ng/L. Hajšlová J. et al. (ICT, 1999) showed higher total amount of organochlorine pesticides in waters of Moravian rivers after a flood in 1997. Concentrations ranged from 12.9 to 33.1 ng/L. Levels of lindane found in soils in the Czech Republic between 1993 – 2001 according to I. Holoubek et al. (2002) ranged from a low of 0.02 ng/g (in Košetice) to a maximum of 356 ng/g dry weight (from measurements in the vicinity of motorways in the Czech Republic).

P1.11 Endosulfan

Endosulfan	
Chemical name (IUPAC)	6,7,8,9,10,10-Hexachloro-1,5,5a,6,9,9a-hexahydro-6,9-methano-2,4,3-benzodioxathiepine-3-oxide
CAS No	115 – 29 – 7
EINECS No	
Molecular weight	406,9226
Formula	C ₉ H ₆ Cl ₆ O ₃ S
 <p>alfa – endosulfan CAS No: 959 – 98 – 8</p>	 <p>beta endosulfan CAS No: 33213 – 65 – 9</p> 
Water solubility	5,3×10 ⁻¹ (25°C); 0,51 g×m ⁻³ (0.05 – 0.99 g×m ⁻³)
Log K _{ow}	3,55
Melting point	109 °C
Boiling point	323.4 °C (760 mmHg)
Vapour pressure	4.2×10 ⁻⁵ mmHg (20°C)
Henry's Law Constant	3.5×10 ⁻⁶ Pa m ³ mol ⁻¹ (25 °C)

Endosulfan occurs as two isomers: alpha- and beta endosulfan. They are both biologically active. Technical endosulfan (CAS No: 115 – 29 – 7) is a mixture of the two isomers along with small amounts of impurities.

Sources

According to the risk management evaluation on endosulfan, adopted by the POPRC, endosulfan is an insecticide that has been used since the 1950s to control crop pests, tsetse flies and ectoparasites of cattle and as a wood preservative. As a broad – spectrum insecticide, endosulfan is currently used to control a wide range of pests on a variety of crops including coffee, cotton, rice, sorghum and soy. A total of between 18,000 and 20,000 tons of endosulfan is produced annually in Brazil, China, India, Israel and South Korea. Colombia, the USA and several countries in Europe that used to produce endosulfan have stopped its production. The largest users of endosulfan (Argentina, Australia, Brazil, China, India, Mexico, Pakistan and the USA) use a total amount of about 15,000 tons of endosulfan annually. The use of endosulfan is banned or will be phased out in 60 countries that, together, account for 45 per cent of current global use.

Environmental fate

Endosulfan is most often applied by spraying. The application can therefore lead to local contamination of the air, endosulfan can be sent via air over long distances. It can also get into the air as a result of volatilization of endosulfan applied to plants. Contrary to the situation in the atmosphere, endosulfan in soil is relatively immobile due to strong adsorption to soil particles. Adsorption is also significant in aquatic systems. It is necessary to look at endosulfan as a persistent substance. This may be due to their lipophilic nature, to some extent accumulate in the bodies of organisms, but not to its spread through the food chain.

Exposure

Endosulfan can enter the body orally, by inhalation or contact with skin. Possibilities include mainly professional intoxication (inhalation, contact with skin), consumption of contaminated food (although endosulfan concentrations in food are relatively low) and contact with contaminated soil. In the body is rapidly metabolized and excreted and prevents its accumulation. Toxicity of organochlorine pesticides generally is due to their ability to change the properties of the membrane of nerve cells. This distorts the kinetics of transfer of sodium and potassium. It causes hyperactivity, vomiting, dizziness, headaches and cramps. Severe poisoning can lead to death. Data from animal tests indicate that endosulfan can also damage their liver, kidneys, testes and immune system. Endosulfan is not considered as a carcinogen.

Hazard assessment for endpoints of concern

Endosulfan has high acute toxicity to fish. Has toxic effects on some terrestrial plants, for example, can reduce germination. The toxicity to birds is relatively high under laboratory conditions, but in the environment has been no poisoning.

Summary

Endosulfan is dangerous compound, belongs to a class of pesticides and is highly toxic to aquatic environment. Penetrates into the plant tissue where change to more toxic compounds for Arthropod than endosulfan. It is highly toxic to aquatic organisms, may cause long – term adverse effects in the aquatic environment. Endosulfan is also highly toxic. For beneficial arthropods including bees is moderately toxic.

Legislation

The main legislative instrument in the Czech Republic governing representation on presence of endosulfan in aquatic environment is Government Regulation No 61/2003 Coll. Indicators and values of permissible pollution of surface water and waste water, requisites of a permit to discharge wastewater into surface water and sewage systems and sensitive areas which sets emission standards for the content of endosulfan in surface water and requires no increase in its content in sediments, suspended matter and living organisms. Endosulfan in Annex 1 of Act No 254/2001 Coll. on waters, as amended, set out as dangerous harmful substances (biocides).

The Senate approved on April 26th in 2012 the ratification of the amendment to Annex A of the Stockholm Convention on persistent organic pollutants. This is the complete list of endosulfan. This substance cannot be used in the Czech Republic since 2004 and within the EU the use of endosulfan was prohibited by Council Directive 91/414/EEC concerning the placing of plant protection products on the market (see in Annex I to this Directive). Amendment to Annex A of the Stockholm Convention was adopted at the fifth session of the Conference of the Parties to the Stockholm Convention, which was held in April 2011 in Geneva, Switzerland. Endosulfan is on the list of potential threatening substances (OSPAR Convention)

Occurrence in the environment of the Czech Republic

Endosulfan is released into the environment when applied as an insecticide or funds for the preservation of wood. In the Czech Republic, Now it is used to a limited extent in the Czch Republic, but may be included due to the contamination caused by the past (including the old stocks and contaminated pesticide storages). According to the available data, endosulfan is neither produced in nor imported to the Czech Republic.

P1.12 Profiles of chemicals under review of POPs Review Committee

Short chain chlorinated paraffins (SCCPs)

Chlorinated paraffins (CPs) are chlorinated derivatives of commercially produced *n* – alkanes. A carbon chain length ranges from 10 to 38, and chlorine content from about 30 to 70 %. There is a range of commercially available mixtures of different carbon chain lengths and different degrees of chlorination. Short chain chlorinated paraffins are defined by UNECE as those having a carbon length between 10 and 13 carbon atoms. Other commercial mixtures are known as “Medium chain length” (typically C_{14–17}) and “Long chain length” (typically C_{20–30}). These mixtures are further subcategorized according to their weight content of chlorine: 30 % – 50 %, 50 % – 60 % and 60 % – 70 %. The general formula of chlorinated paraffins is C_n H_{2n+2–z} Cl_z.

Environmental fate

The atmospheric half life varies depending on the reaction of hydroxyl radicals with from 0.81 to 10.5 days. Importance of hydrolysis in the aquatic environment is not expected. Half – life for sediment varies between 12 ± 3.6 days and 30 ± 2.6 days for products with 56% and 69% chlorine content.

1630 days is the half – life in the freshwater sediments and 450 days in the sea sediments under the aerobic conditions. In the anaerobic conditions there was little or no mineralization observed. SCCPs can persist in anaerobic sediments for more than 50 years. However, there is a lack of information about the persistence of these pollutants in the soil.

Log K_{ow} values vary in a range of 4.8 and 7.6 for all possible congeners. The model value of BAFs was greater than 5000 as well as for all SCCPs. For some food chains BMFs value was greater than 1, indicating biomagnificence.

Bioconcentration factor changes significantly depending on the species.

Laboratory data depending on the type and tested congener BCFs range between 1900 – 138000, in real terms, the value is between 16 440 – 26 650. Available empirical and model data demonstrate the ability of SCCPs to accumulate in biota.

SCCPs were detected in biotic and abiotic samples from the Arctic region. Vapor pressure (2.8×10^{-7} – 0.028 Pa) and Henry's law constant (0.68 – 18 Pa m³/mol for C_{10–12} congeners) are within the range of POPs values known for its ability to long – term transport. For several SCCPs was estimated amount of contamination potential of the Arctic (ACP), close to the ACP values for tetra– to heptachlorobiphenyls. This information shows the SCCPs potential for a long range transport.

Exposure

SCCPs were detected in the atmosphere, sewage sludge, surface water and sediments. Equally, are found in biotic samples (Canada, Great Britain, Chile, Greece, Germany, Greenland, France, Sweden, USA, North Sea and Arctic biota). In humans, these compounds have been detected in human milk.

Hazard assessment for endpoints of concern

According to IARC (1990) these substances belongs to the group of possible carcinogens (2B). EU has put these compounds into Category 3: R 40, i.e. the carcinogenicity of these substances is not sufficiently demonstrated. SCCPs have low toxicity generally, according to EC (2005), non – specific, followed by repeated exposure, with a NOEL value for general toxicity of 100 and 1000 mg/kg / day in rats and mice.

The most sensitive aquatic organism to the presence of SCCPs was *Daphnia magna* with NOEC value of 5µg / L. In birds (*Anas platyrhynchos*) was determined NOEC value of 168 mg/kg diet.

The concentrations of SCCPs, which are currently measured in the environment, are generally below the level of concentration, which showed toxic effects in laboratory conditions. For the pelagic, benthic and soil organisms, the maximum concentration is generally an approximately 50 – 200x lower than the lowest concentrations of having toxic effects. However, there are places that exceed this concentration. It is a city like Hamilton, Detroit, where the concentration is found in fish in the harbor, respectively. in the river. Estimate the upper limit of concentration of the daily intake for humans is in the range of TDI for these compounds.

Summary

At present there is a decrease in their use due to increased SCCPs control. In several states, however, there is still a significant amount used. Available empirical and model data show the persistence, bioaccumulation and toxicity of these substances, especially to the aquatic organisms. SCCPs have also tendency to the long – range transport and thus may lead to adverse effects on human health and the environment.

Legislation

Their use as liquids in metal is banned in the European Union from January 2004 (for the use of substances or as constituents of other substances or preparations in concentrations higher than 1%) according to Decree No 402/2011.

For surface water, the applicable limits are 0.5 µg/L (Regulation No 61/2003 Coll., Annex 3, Category dangerous and especially dangerous substances); for groundwater, A = 0.1 µg/L, B = 50 µg/L, C = 100 µg/L (limits according to the methodological instruction MoE (MoE Bulletin 3/1996) for chlorinated aliphatic hydrocarbons).

Limit values for chlorinated aliphatic hydrocarbons for agricultural land (Decree No 13/1994 Coll.): Each 0.1 mg/kg dry matter and total (sum of all chlorinated aliphatic hydrocarbons): 0.1 mg/kg of dry matter.

Limits for soils under Methodical instruction MoE (MoE Bulletin 3/1996) for each chlorinated aliphatic hydrocarbons in mg/kg of dry matter:

A = 0.001, B = 15, C (habitable) = 20 C (rekr.) = 30, C (average) = 50

Decree No 402/2011 Coll. Alkanes also sets limits for pharmaceuticals, veterinary products, and cosmetics. Decree No 448/2009 Coll. alkanes classify the list of substances which must not form part of the composition of cosmetic products.

Chlorinated alkanes C₁₀₋₁₃ are given in Annex 1 of Act No 254/2001 Coll. on waters listed as a dangerous substance abuse: (group of substances organohalogen compounds and substances), they are registered in the IPR.

Occurrence in the environment of the Czech Republic

These compounds are not produced in the Czech Republic, but imported from Slovakia (Novácké chemické závody Ltd.). The quantity is unknown. Traces were detected in sediment samples from all the main Czech rivers and also from the regional background observatory Košetice.

The concentrations of chlorinated short – chain paraffins (C_{10 – 13}) were monitored in the freshwater sediments in the Czech Republic in the years 2001 and 2002. There were 42 sediments samples collected:

Košetice (14), Zlín (10), Beroun (18). The concentrations were as follows:

Košetice: ΣC_{11-13} : 24 – 45.78 ng/g dry weight, Zlín: ΣC_{10-13} : from 16.30 to 180.75 ng/g dry weight, (6 samples > 100 ng/g dry weight)

Beroun: ΣC_{10-13} : 4.58 – 34 ng/g dry weight (only 5 samples in 2001).

In a pilot study, which was measured using gas chromatography with a short column, there was presence of SCCPs demonstrated in the Czech Republic. In all study sites were detected SCCPs on the concentration levels: from 24.00 ng/g to 45.78 ng/g (dry weight) in Košetice, from 16.30 ng/g to 180.75 ng/g (dry weight) in Zlín, and from 4.58 ng/g to 21.57 ng/g (dry weight) in Beroun. The most contaminated site was Zlín district respectively sediment from the Dřevnice River (Malenovice). In mixtures dominated molecules with 7 – 8 molecules of chlorine. The degree of chlorination is compared with Western Europe (45 – 62%) higher. In the samples was determined organic carbon content. The contamination level showed no correlation with the amount of the organic carbon content. (RECETOX – TOCOEN & Associates).

Hexabromocyclododecane (HBCDD, HBCD)

HBCDD is a non – aromatic cyclic alkane substituted with four bromine atoms. The commercially produced mixtures occur in three diastereomers: alpha, beta and gamma.

HBCD is industrially produced by cyclododecane bromination or addition of bromine to the compound cis, trans, trans-1,5,9-cyclododekatrien, and in both cases there is a mixture of three diastereomers – alpha, beta and gamma. HBCD is used as additive flame retardant i.e. that is not tightly bound in a matrix, it is dispersed throughout its volume, without it were chemically bound or reacted with it, which could easily lead to the release into the environment.

The human organism, receives HBCD 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.

The occurrence of HBCD monitors in biotic (fish, breast milk, subcutaneous fat) and abiotic samples (sewage sludge, river sediments, dust) in the Czech Republic.

Literature:

Pulkřabov J., Hajřlov J., Poustka J., Kazda R.: Fish as Biomonitor of Polybrominated Diphenyl Ethers and Hexabromocyclododecane in Czech Aquatic Ecosystems: Pollution of the Elbe River Basin, *Environmental Health Perspectives*, 115, 2007, 28 – 34.

Hajřlov J., Pulkřabov J., Poustka J., ajka T., Randk 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.

Pulkřabov J., Hajřlov J., Vliv zneiřtn sediment a odpadnch kal z istren odpadnch vod na ekotoxicitu a biodiverzitu danho ekosystmu, stav chemie a analzy potravin, VřCHT Praha (<http://www.vscht.cz/zkp/>).

Pulkřabov J., Hrdkov P., Hajřlov J., Poustka J., Npravnkov M., Polcek V.: Brominated Flame Retardants and Other Organochlorine Pollutants in Human Adipose Tissue Samples from the Czech Republic, *Environment International* 35, 2009, 63 – 68.

Polychlorinated naphthalenes (PCNs)

PCNs are a group of substances with a theoretically possible 75 congeners. Their physical and chemical properties are similar to PCBs. 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.).

PCNs 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 an additives in motor oils, etc. After the Second World War, the production and use of PCN mainly decreased because they have been replaced by plastics and PCBs.

PCN can still be detected in some electronic components. Other sources are waste incinerators, transport, and chemical industries.

PCN exhibit toxic effects similar to PCDD / PCDFs and coplanar PCBs. They can cause chloracne, jaundice, cancer or even death.

Literature:

<http://www.unece.org/fileadmin/DAM/env/lrtap/TaskForce/popsxg/2000 – 2003/pcn.pdf>

Pentachlorophenol (PeCP)

Pentachlorophenol (PeCP) is one of the most famous polychlorinated phenols (PCPs). It was used primarily for protective coatings and wood preservatives. PeCP is often contaminated with dioxins and furans (produced as an unwanted by – product of pentachlorophenol).

PeCP releases to the environment during combustion of materials containing chlorine (eg PVC), the pyrolysis of polychlorinated biphenyls from the exhaust of cars. Pentachlorophenol arises also in the manufacture of chlorophenols, hexachlorobenzene and PCBs and as a by – product of the bleaching of cellulose.

In the Czech Republic the production was realized in Spolana Neratovice and Spolchemie in Usti nad Labem, operations are already closed and waiting for remediation.

Its half – life in water is more than 194 days, in sediments 17 – 356 days and soils 194 – 345 days.

Literature:

Lerche, D., et al., Selecting chemical substances for the UN – ECE POP Protocol. *Chemosphere*, 2002. 47(2002): p. 617 – 630

Hexachlorobutadiene (HCBD)

It 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 and as a fill of gyroscopes. It is a by –

product of the industrial production of some chlorinated hydrocarbons, may form in landfills during the decomposition process of waste containing chlorine and in a small extent in a waste incineration.

Hexachlorobutadiene is a synthetic compound, prepared and used by man. There is not a natural emission sources. It is a highly persistent compound, in the soil has a very low mobility and has a high potential for bioaccumulation. It is very toxic for aquatic organisms and human health.

Commonly occurring concentrations of hexachlorobutadiene in water are about 0.003 mg / l. In the areas near the chemical plant where hexachlorobutadiene is manufactured or used, much higher concentrations (0.022 to 43 mg / 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 bioaccumulation in fish and shellfish. 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.

Hexachlorobutadiene is due to its dangerous properties compound that adversely affects the individual components of the environment. The danger is accentuated by its high bioaccumulation potential.

Literature:

<http://toxnet.nlm.nih.gov>

<http://www.recetox.muni.cz/>

<http://www.epa.gov>