GLOBAL MONITORING PLAN
FOR PERSISTENT ORGANIC POLLUTANTS

UNDER THE STOCKHOLM CONVENTION ARTICLE 16 ON EFFECTIVENESS EVALUATION

THIRD REGIONAL MONITORING REPORT

CENTRAL AND EASTERN EUROPEAN REGION
2021

ANNEXES
A1: Filled country questionnaires
A2: Additional data (trends)
A3: Information related to chapter 5.3.

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Annex 1: Information from countries

This annex contains filled questionnaires as provided to the CEE ROG by the countries in the region in 2019 and 2020. Please note that some countries provided more than one questionnaire as their responses were provided at an institutional level.

Content

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ARMENIA

Country: Republic of Armenia, Environmental Monitoring and Information Center SNCO		
contact information (contact person name + e-mail/telephone): **Gayane Shahnazaryan, gayane_shahnazaryan@yahoo.com**		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***NO***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		number of sampling sites
Existing capacity for POPs sampling/analysis in other media (list which media below) ***YES***		
HUMAN Matrices Y/N	Human Blood Y/N	WATER ***Y***
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)		
Existing capacity for sample treatment and POPs analysis in your country ***YES***		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)
Environmental Monitoring and Information Center state non-commercial organization, Ministry of Environment of the Republic of Armenia	organochlorine pesticides (OCPs), polychlorinated biphenyls (PCBs)	No, system does not have QA/QC, SOP
Institute of chemical physics of the National Academy of Science of the Republic of Armenia	OCPs, PCBs	No, system does not have QA/QC, SOP
Requirements for capacity-building on POPs monitoring in your country ? ***YES*** (indicate what capacity strengthening would be necessary)		

if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	• Preparation of POPs monitoring strategies according to sources of POPs types and environmental media • Development of POPs monitoring programmes and sampling procedures • Inter-laboratory information exchange on POPs monitoring related data • Procurement of equipment and reagents, obtaining international accreditation, approval of standard procedures for POPs determination in soil, water, biomedia, foodstuffs and imported/exported products • Improve technical capacity • Develop methods of laboratory analysis and sampling • Trainings
Does your country have the capacity to provide capacity building to other countries? ***NO***	
if YES, please indicate what capacity-building your country could provide (add rows as necessary)	
Does the country have a NIP that covers also POPs monitoring? ***YES***	
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)	
National Programme of Activities to be Implemented under the "National Implementation Plan for the Stockholm Convention on Persistent Organic Pollutants in the Republic of Armenia, 2016-2020"	
Protocol Decision of the Republic of Armenia Government "On Approval of the List of Activities to be implemented in 2016-2020 within the National Program for Implementation of the Stockholm Convention on Persistent Organic Pollutants in the Republic of Armenia" (No. 49 of December 8, 2016)	
Does the country carry out research that generates data on POPs? ***YES***	
if yes, please provide references/citations or links to reports, reviews or publications containing further details 1. Institute of Chemical Physics carried out the research in Lake Sevan Basin since 2016, but did not have published results of the works yet. 2. Under the activities of UNECE LRTAP convention in transboundary EMEP station to assess POPs content in air, passive sampling was done and samplers were sent to NILU for analysis.	

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BOSNIA AND HERZEGOVINA

Country: Bosnia and Herzegovina		
Contact information (contact person name + e-mail/telephone): Trajče Stafilov, trajcest@pmf.ukim.mk; Tel: +389 70 350756		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***NO*** *- please choose one answer NO*		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		**POP-s samples were taken at two sites for analysis PCB, HCH, DDT, HCB, PAH in Banja Luka – in industrial area „Incel factory“ (previous soil sampling in 2005 confirmed significant soil contamination) and Modrila oil refinery during the implementation of the passive monitoring of POPs in ambient airpart: A pilot study for the development of a monitoring network in Central and Eastern Europe (MONET_CEEC), 2006. The sample analysis was done by RECETOX. MONET-CEEC was focused on measuring POPs substances in the Air.**
Existing capacity for POPs sampling/analysis in other media (list which media below) ***NO***		
HUMAN Matrices **N**	Human Blood **N**	WATER **Y**
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)**: We had some of the projects funded by different donors which included POPs analysis as well as:** **1. POPs in Rivers in Bosnia and Herzegovina“(Norwegian Institute for Water Research“(NIVA) and the Faculty of Pharmacy at the University of Sarajevo), 2006 – 2009.** **PCB content in river sediments (during 2008 and 2009, tests conducted on POPs content in the sediment from the river Bosna, by using the semipermeable membrane devices for passively sampling from water (SPMD and fish). The locations were the sediment sampling was conducted are: Vrelo Bosne, AT THE Roman bridge in Sarajevo, Semizovac, Bosna at the river Lašva, Bosna in Žepče, Bosna in Doboj – upstream and downstream, Bosna at the river mouth Spreča, Bosna in Modriča and Bosna in Bosanski Šamac.** **2. POPs content in the river water (during 2007, performing tests to determine the presence of POPs in the water of the river Neretwa (one of the two largest rivers in Bosnia and Herzegovina), az location Glavatičevo – Lađanica, Salakovac and Gabela)** **3. Project nato esp.eap.sfp. 984 073 „ Development of decision support systems to reduce the risk of environmental pollution of the Bosna River“ was focused on examing the content of POPs in sediments and water river Bosna.**		

During the developing of the inventory, the Environment, Health, Research and Development Group for preparation NIP Bosnia and Herzegovuina (2013-2015) was unable tofind neither information systematic studies about the effect of POPs on human health in BiH, nor data on the assessment of public health risks associated with the pressence of these substances in the environment and food.		
Existing capacity for sample treatment and POPs analysis in your country ***NO*** - *please choose one answer*		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)
Requirements for capacity-building on POPs monitoring in your country ? ***YES*** (indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	**Strengthening the technical capacities for collecting, organizing, structuring and processing data on POPs in Bosnia and Herzegovina, including the establishment and coordination of information systems in FBiH entity, RS entity and Brčko District and improving the exchange of information between the competent institutions.** **Enabling public access to all information related to the implementation of the Stockholm Convention, the results of the monitoring of pollutants and the results of health studies on the effects of POPs on the population in Bosnia and Herzegovina.**	
Does your country have the capacity to provide capacity building to other countries? ***NO***		
if YES, please indicate what capacity-building your country could provide (add rows as necessary)		
Does the country have a NIP that covers also POPs monitoring? ***YES***		
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary). **All necessary information are in National Implementation Plan (2015), on the page from 306 to 312.**		

Does the country carry out research that generates data on POPs? ***NO*** *- please choose one answer*
if yes, please provide references/citations or links to reports, reviews or publications containing further details

List of POPs data available in your country

Existing national monitoring programme/ activity/ dataset	Matrix	Laboratories and Institutions involved in sampling	Laboratories and Institutions involved in POPs analysis	Involvement of intl. & reg. Programmes/ data accessibility	Time frame

BULGARIA

Country : Bulgaria		
Ms. **Rada Dimitrova**, Ministry of environment and water, "Strategic Environmental Assessment, Environmental Impact Assessment and Pollution Prevention" Directorate, tel: +35929406284 Ms. **Hristina Filipova**, Ministry of environment and water, "Strategic Environmental Assessment, Environmental Impact Assessment and Pollution Prevention" Directorate, tel: +35929406024		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***YES***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		number of sampling sites Please see bellow
Monitoring of the air quality, incl. POPs monitoring (HCB, PAH, PCB, PCDD/PCDF) (NAAQMS) comprised of **54 stationary points**, including **10 points with manual sampling** and subsequent laboratory analysis, **30 automatic measuring stations** (AMS), **10 automatic DOAS systems** (optical), as well as **4 AMS** for monitoring the air quality in forest ecosystems. The air quality system has also **6 mobile automatic stations** (MAS). All 16 (Regional Laboratory) RL of Executive Environmental Agency (EEA) have automatic gas analyzers and sampling equipment for control of the emissions of harmful substances in the air, , installed on motor vehicles.		
Existing capacity for POPs sampling/analysis in other media (list which media below) YES / NO - please choose one answer		
HUMAN Matrices ~~Y~~/**No**	Human Blood ~~Y~~/**No**	WATER **Yes**/~~N~~
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)		
Surface water monitoring is part of the National Environmental Monitoring System (NEMS) and covers monitoring and operational monitoring. **The monitoring of drinking water is carried out by the Basin Directorates for Water Management through the Regional Laboratories to the EEA, the Regional health inspectorates** **Information system for local soil contamination with obsolete POPs pesticides**		

The Soil Monitoring Information System at level III monitors and records the processes of local soil contamination around the old storage facilities for banned and obsolete pesticides, incl. and POPs pesticides: aldrin, dieldrin, DDE / DDD / DDT, HCH compounds, lindane, mirex and heptachlor, sites where contamination of adjacent terrains is expected due to leaking roofs, decomposed buildings and exposure to atmospheric products**.**

Information System for Industrial Soil Pollution with PCB and PAHs

The Soil Monitoring Information System at Level II consists of national networks of regional process monitoring stations, incl. and industrial soil contamination with POPs: 6 PCBs (PCB28, PCB52, PCB101, PCB138, PCB153, PCB180) and 16 PAH compounds). Sampling is performed locally by RL and the analysis is based on 4 base RLs. The organization, coordination, quality control and evaluation are carried out by the EEA. For the year 2015, there were no exceedances of the concentration limit for PCBs and PAH in soils.

* The hydrobiological monitoring of coastal sea waters is carried out by the Institute of oceanography at the Bulgarian Academy of Sciences (BAS) according to methodology developed by the Institute and the results are sent to the Black Sea RBD ant to EEA.

For food sampling: Ministry of Agriculture and Forestry through Bulgarian Safety Food Agency

For control of veterinary drugs residues and environmental pollutants in live animals, raw materials and food of animal origin, feed and feed additives: The Central Laboratory of Veterinary Control and Ecology (CLVCE) at the BSFA

*The data for monitoring of PCB in **human milk** are scarce. No own studies of the PCB levels in human milk or blood plasma have been conducted in Bulgaria so far. Apart from data of analysis of PCB in human milk conducted within the study of WHO during 2001-2002, there is no other available information on that issue.

In Bulgaria no independent national research has been performed as regards the levels of persistent chlororganic pesticides in human milk or blood plasma up to date.

Apart from data for analysis of POPs pesticides in human milk performed within the study conducted by WHO in the period 2001 -2002, there is no other available information on this issue.

Existing capacity for sample treatment and POPs analysis in your country **YES**

In Bulgaria there are 25 accredited laboratories for testing of different matrices / products (environmental components, food, bottled water destined for human consumption, biocides, PPP and fertilizers, detergents, cosmetics, etc.) and various analytes / (heavy metals, pesticides including POPs, chlororganic and phosphorus pesticides, PCB, PAH and other chemical elements and compounds) in the system of MoEW, Ministry of food and agriculture (MFA) and Ministrsy of health (MH). They are accredited for all their activities according to the requirements of BDS EN ISO / IEC 17025: 2006, have a Quality Management System in place, are equipped with the necessary analytical equipment, have highly qualified personnel and apply the standards and methods according to the current European and national legislation in the relevant area of testing.

In the MOEW / EEA system, there are 7 accredited laboratories out of a total of 15, which take samples and analyze them for POPs pesticides, HCB, PCB, PAH in soils and water (surface and underground) and 12 accredited laboratories that perform tests for heavy metals, including mercury (11 laboratories).

The Bulgarian Food Safety Agency system has two accredited laboratories to control the content of pollutants (pesticide residues, including POPs pesticides, heavy metals, nitrates, etc.) in food of plant and animal origin, feed, PPP identification and assessment trials the compliance of plant protection products and fertilizers, where Central Laboratory of veterinary-sanytary expertise and ecology is accredited to carry out testing of raw materials and products of animal origin and biological fluids and PCBs, while Central laboratory for chemical testing and control is accredited to conduct testing of raw materials and products of plant origin for fish its residues, incl. and POPs pesticides.

There are 8 accredited laboratories in the system of MH-National Centre for public health and analyses and Regional health inspectorates , of which 6 are accredited for testing POPs pesticides in food and / or water and / or heavy metals.		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	**which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)**	**Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)**
Central Laboratory of veterinary-sanitary expertise and ecology	**PCB in Raw materials and products of animal origin and biological fluids PCB in Raw materials and products of plant origin, feed and feed additives**	
Central Laboratory for chemical testing and control	**Pesticide residues (flexible scope of accreditation), incl. POPs**	
MAIN DIRECTORATE "LABORATORY - ANALYTICAL ACTIVITY", CENTRAL LABORATORY	**POPs pesticides , PCB, PAHs in surface and groundwater water and wastewater , soils**	
7 Regional laboratories under EEA in: Blagoevgrad, Burgas, Varna, Veliko Tarnovo, Pleven, Plovdiv, Stara Zagora	**POPs pesticides , PCB, PAHs in different matrices: surface and groundwater water and wastewater , soils, sediments, etc.**	
LABORATORY TESTING COMPLEX under Regional Health Inspectorates in Varna, Burgas, Sofia, Veliko Tarnovo	**POPs pesticides in food, PCB, PAHs, organochlorine pesticides in water**	
Requirements for capacity-building on POPs monitoring in your country ? **No** (indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)		
Does your country have the capacity to provide capacity building to other countries? **No**		
if YES, please indicate what capacity-building your country could provide (add rows as necessary)	-	
Does the country have a NIP that covers also POPs monitoring? **YES**		

If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, **contact person and his/her contacts** (add rows below as necessary)
Bulgaria is currently developing an update of its NIP for POPs in order to include all POPs under the Stockholm convention. And under NIP we cover also POPs monitoring data activities. Existing programmes for monitoring releases and environmental human health impacts- there are number of existing subsystems for monitoring of harmful pollutants in the environmental media including POPs, in Bulgaria as a part of National environmental monitoring system (NEMS). For information support a National automated system for environmental monitoring (NASEM) is established at national, basin and regional level. The state of environment is assessed by Regional Inspectorate of Environment and Water (RIEW) and the Executive Environment Agency (EEA). The database for harmful substances in atmospheric air includes information about emissions from all kind of sources of harmful substances, from atmospheric activity and nature – summarized in groups. The emissions of following harmful substances are controlled: dust, Sulphur dioxide, nitrogene dioxide, PAH, PCBs, HCB, PCP, DIOX, methane, non-methane carbons, ammonia, carbon oxide, Hg, Cd and Pb. On a daily basis, NAAQMS controls the concentrations of the main parameters of the ambient air, incl. PAH. Additionally, according to the nature and the sources of the emissions in separate regions of the country some specific pollutants are controlled. All AMS and DOAS work in a continuous 24-hour mode and the data for the QAA gathered by them are received in real time by the respective regional control points and the central control point in Executive Environment Agency (EEA) Sofia. The air quality system has also 6 mobile automatic stations (MAS). All 16 (Regional Laboratory) RL of EEA have automatic gas analyzers and sampling equipment for control of the emissions of harmful substances in the air, installed on motor vehicles. The monitoring of surface water is part of the NSEM and covers programs for surveillance and operative monitoring. The programmes for surveillance monitoring provide the necessary information to evaluate the status of the water within the river basin or sub-basin. The operative monitoring programmes determine the status of the water bodies at risk and assess any changes resulting from the implementation of the programme of measures. The networks for surveillance and operative monitoring of surface water and the parameters measured by them are regulated by an Order of the Minister of environment and water. The total number of the points in the country is 533 allocated in the four river basin management regions. The monitored parameters are divided into three main groups – basic physico-chemical parameters, priority substances and specific pollutants. POPs fall into the second and third group. From the priority substances HCB, PeCB, PCP, PAH, SCCPs, C10-13; penta-BDE (congeners No. 28, 47, 99, 100, 153 and 154), HCBD are monitored, and from the specific pollutants - aldrin, dieldrin, endrin, isodrin, DDT (sum) and p,p-DDT. Implemented in compliance with Order of the Minister of environment and waters. Hydrobiological monitoring of surface water is carried out for the categories: river, lake/reservoir and coastal water. The points intended for hydrobiological monitoring are not completely monitored each year – the implementation of the programmes is allocated in the period 2010 – 2015 and annually between 500 and 600 points are monitored depending on the capacity of the analytical laboratories and the programmes planned by RBD. Hydrobiological monitoring is carried out by 9 RL, the results are sent to EEA and RBD. The hydrobiological monitoring of coastal sea waters is carried out by the Institute of oceanography at the Bulgarian Academy of Sciences (BAS) according to methodology developed by the Institute and the results are sent to the Black Sea RBD ant to EEA. The network for monitoring of surface water intended for public drinking water supply comprises of 216 points. The sampling frequency depends on the number of the population, served by the respective water source and varies from 1 to 12 times per year. The networks for monitoring of ground water comprise of 290 points for surveillance and operative monitoring. In reality, sampling points in 2010 are 313 points. The points for monitoring the quantitative status of the ground water include: 282 points for measuring the water level and 112 points for measuring the water flows, of them 69 points do surveillance monitoring, and 8 points surveillance and operative monitoring. 299 points from the network for quantitative monitoring are served by the National Institute of Meteorology and Hydrology (NIMH) at BAS. RBD monitors independently 76 points, and 4 of the EEA laboratories take samples in 19 points. The monitoring of ground water in 2010 was conducted in 313 points, and 1245 samplings were performed.

A new soil monitoring programme has been developed and approved by the Minister of the environment and water, which is organized on three levels. It is fully compatible with the last requirements of EC and the European Environment Agency, as well as the national legislation. NSSM includes collection, evaluation and summarizing the information on soils, as well as the maintenance of the information system for the status of the soils and their alteration. The soil monitoring schemes are approved by an Order of the Minister of the environment and water.

Since 2011, Bulgarian Safety Food Agency (BSFA) at the Ministry of Agriculture and Forestry (MoAF), has undertaken the control of the food throughout the food chain and combines 3 monitoring programmes into a National programme for monitoring of pesticide residues and other harmful substances in and on food of plant and animal origin (NPMCR). The National programme for monitoring of pesticide residues in and on food of plant and animal origin.

Since 2011, BSFA at the MoAF, has undertaken the control of the food throughout the food chain and combines 3 monitoring programmes into a National programme for monitoring of pesticide residues and other harmful substances in and on food of plant and animal origin (NPMCR). Monitoring programme for control of veterinary products residues and of live animals and animal products containing environmental contaminants for 2010, BSFA
The monitoring programme is part of the NPMCR and aims at observation of certain substances and residues thereof in animal products.

The Central Laboratory of Veterinary Control and Ecology (CLVCE), Sofia at the BSFA is designated as the National Reference Laboratory (NRL) for control of veterinary drugs residues and environmental pollutants in live animals, raw materials and food of animal origin, feed and feed additives. Groups of residues and contaminants, which are subject to control include also organochlorine compounds, including PCB, chloroorganic pesticides (DDT sum of isomers, aldrin, heptachlorine epoxide, HCH. Monitoring programme for pesticide residues in raw materials and products of plant origin during harvesting for 2010. The monitoring programme is part of NPMCR. The monitoring of pesticide residues is directed towards ensuring the correct application of the permitted plant protection products in compliance with the Good Plant Protection Practice (GAP).

The POPs pesticides, subject to the programme include aldrin, DDT, dieldrin, dicophol, endosulfan and endosulfan sulphate, endrin, HCH and lindane, HCB, heptachlorine and heptachlorine epoxide, and in 2009 - aldrin, DDT, dieldrin, dicophol, endosulfan, HCH and lindane and HCB. The monitoring programme is part of NPMCR. Its main objective is to exercise control over the grain crops intended for the production of feed, during harvesting in 2010 for the correct application of plant protection products, improper use of unauthorized plant protection products or unauthorized use of the respective crop, as well as the presence of undesired POPs pesticide residues and contamination with mycotoxins. The European legislation is transposed in the national legislation by Ordinance No. 10 dated 3 April 2009 concerning MAC of undesired substances and products in feed.

The List of active substances in the composition of the pesticides, subject to control for the correct application of plant protection products in the primary production of feed includes also the POPs pesticides (aldrin and dieldrin (independently or sum aldrin+dieldrin, expressed as dieldrin); chlordane (combination of cis- and trans-isomers of oxychlordane expressed as chlordane); DDT (sum of DDT-, DDD- (or TDE) and DDE-isomers, expressed as DDT); endrin (sum of endrin and delta-ketone-endrin, expressed as endrin); alpha- and beta - endosulfan; heptachlorine (sum of heptachlorine and heptachlorine- epoxide, expressed as heptachlorine); HCB; ・- and ・- and ・-ＨＣＨ. Apart from data for analysis of POPs pesticides in human milk performed within the study conducted by WHO in the period 2001 -2002, there is no other available information on this issue. Within the elaborated by 19 countries (Brazil, Bulgaria, Croatia, Czech Republic, Egypt, Finland, Hungary, Ireland, Italy, New Zealand, Norway, Romania, Russia, Slovakia, Spain, Sweden, The Netherlands, Ukraine) international project “3rd Round of WHO-coordinated Exposure Study on the Levels of PCB, PCDD/PCDF in Human Milk, Organohalogen Compounds, 2003” in Bulgaria there has been conducted a study of the content of certain POPs pesticides in human milk from 30 healthy women, distributed by 10 from three regions in the country. The results show that the levels of POPs pesticides in human milk in Bulgaria are among the lowest for the 19th countries.

Does the country carry out research that generates data on POPs? **NO**

if yes, please provide references/citations or links to reports, reviews or publications containing further details

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CROATIA

Country : Croatia		
contact information (contact person name + e-mail/telephone): Draženka Stipaničev, Drazenka.Stipanicev@voda.hr; +385 1 2410 500		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***YES***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		number of sampling sites **sites/measurement satation for air quality , 4 sampling sites: Zagreb-1, Zagreb-3, Sisak-1, Slavonski Brod-1**
analysis by chromatography : ***BaP u PM$_{10}$*** ***Benzo(a)antracen uPM10*** ***Benzo(b)fluoranten u PM10*** ***Benzo(j)fluoranten u PM10*** ***Benzo(k)fluoranten u PM10*** ***Indeno(1,2,3,-cd)piren u PM10*** ***Dibenzo(a,h)antracen u PM10***		
Existing capacity for POPs sampling/analysis in other media (list which media below) **YES**		
HUMAN Matrices **Y/~~N~~**	Human Blood **Y/~~N~~**	WATER **Y/~~N~~**
		SEDIMENT **Y/~~N~~**
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary) **air**		
Existing capacity for sample treatment and POPs analysis in your country **YES - under scientific activities only**		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)
Glavni vodnogospodarski laboratorij **Institute for medical research and occupational health, IMROH, Zagreb** **under scientific activities only:** **Biochemistry and Organic Analytical Chemistry Unit, IMROH**	**organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs** **BaP u PM10** **Benzo(a)antracen uPM10** **Benzo(b)fluoranten u PM10** **Benzo(j)fluoranten u PM10**	**Yes, QA/QC in place (participation in national or international interlaboratory tests (PT), accreditation)** **IMROH is Croatian national referent laboratory for measurement particulate matter PM10 and PM2,5**

	Benzo(k)fluoranten u PM10 **Indeno(1,2,3,-cd)piren u PM10** **Dibenzo(a,h)antracen u PM10**	
Requirements for capacity-building on POPs monitoring in your country ? **YES** (indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	**HR GC MS/MS for dioxine analysis is needed**	
Does your country have the capacity to provide capacity building to other countries? **NO**		
if YES, please indicate what capacity-building your country could provide (add rows as necessary)		
Does the country have a NIP that covers also POPs monitoring? YES / NO - please choose one answer		
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)		
Does the country carry out research that generates data on POPs**? YES**		
if yes, please provide references/citations or links to reports, reviews or publications containing further details **http://iszz.azo.hr/iskzl/godizvrpt.htm?pid=0&t=1 - Air Quality in Croatia, annual reports** **1) Gordana Vuković, Snježana Herceg Romanić, Željka Babić, Bosiljka Mustać, Mirna Štrbac, Isidora Deljanind, Davor Antanasijević. Persistent organic pollutants (POPs) in edible fish species from different fishing zones of Croatian Adriatic. Marine Pollution Bulletin 137 (2018) 71–80.** **2) Želježić Davor, Herceg Romanić Snježana, Klinčić Darija, Matek Sarić Marijana, Grzunov Letinić Judita. Persistent Organochlorine Pollutants in Placentas Sampled from Women in Croatia and an Evaluation of Their DNA Damaging Potential In Vitro Toxicology; Archives of Environmental Contamination and Toxicology. (2018)74:284–291.** **3) Snježana Herceg Romanić, Zorana Kljaković-Gašpić, Tomislav Bituh, Silva Žužul, Marija Dvoršćak, Sanja Fingler, Jasna Jurasović, Darija Klinčić, Gordana Marović, Tatjana Orct, Jasmina Rinkovec, Sanja Stipičević. The impact of multiple anthropogenic contaminants on the terrestrial environment of the Plitvice Lakes National Park, Croatia Environ Monit Assess (2016) 188:27** **4) Zorana Kljaković-Gašpić, Snježana Herceg Romanić, Tomislav Bituh, Vilena Kašuba, Irena Brčić Karačonji, Nataša Brajenović, Iva Franulović, Jasna Jurasović, Darija Klinčić, Nevenka Kopjar, Gordana Marović, Mirta Milić,Tatjana**		

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Orct, Ankica Sekovanić, Davor Želježić. Assessment of multiple anthropogenic contaminants and their potential genotoxicity in the aquatic environment of Plitvice Lakes National Park, Croatia. Environ Monit Assess (2018) 190:694

CZECHIA

Country : the Czech Republic		
contact information (contact person name + e-mail/telephone): Kateřina Šebková, katerina.sebkova@recetox.muni.cz, + 420 604 683 512		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***YES***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		number of sampling sites
integrated monitoring in Košetice, Vysočina Region	**1 active sampler high volume, weekly sampling, 24 hrs**	**1**
MONET-CZ network	**Passive air samplers using the polyurethane foam PUF – since 2003** **2003 – 2013 – continuous monitoring on 46 sampling sites (sampling period 28 days)** **Optimization of the monitoring network in 2014 – number of sampling sites were reduced to 30, sampling period extended to 84 days - as MONET EU**	**up to 46** **28-days exposed PUF disks are analyzed for PAHs, PCBs, OCPs** **analyses (PCDDs/Fs)** **(PCBs) – indicator and dioxin-like** **Brominated flame retardants, Organochlorine, cyclodiene and polar pesticides, Perfluorinated compounds (PFCs) +** **Polycyclic aromatic hydrocarbons (PAHs)**
MONET - EU network in CZ	**passive air samplers, sampling period 84 days**	**4 sites (Košetice, Libuš, Svratouch, Churáňov)**
Existing capacity for POPs sampling/analysis in other media (list which media below) *YES*		
HUMAN Matrices **Y**	Human Blood **Y**	WATER **Y**
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary) - see below in the last part of the questionnaire		

Existing capacity for sample treatment and POPs analysis in your country *YES*		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)
there are several dozens of laboratories that are accredited for PCBs - 59 labs	**PCB**	**national accreditation**
there are 19 dioxin labs		
4 labs accredited EN ISO 17025 able to analyze majority of SC POPs		
RECETOX LSA	**all Stockholm convention POPs, in outdoor/indoor air, surface water, human tissues (blood and its components (serum, plasma), urine and breast milk for scientific purposes), food and feeds, solid samples (soils, sediments, ash, moss, pine needles)**	ČSN EN ISO/IEC 17025:2018 https://www.cai.cz/?subjekt=1666-masarykova-univerzita
VSCHT laboratory	**Food, beverages and water*, food raw materials, fats, oils, food supplements, novel food***, baby and infant food, crops, feedstuffs, plant materials, human and animal tissues and body fluids Waste sludge, sediments and soils, dust, filters, PUF, PBU extracts**	ČSN EN ISO/IEC 17025:2018
www.bioanalytika.cz (emmissions only)	**in emissions only - PCDD/PCDF, PCB + PAHs**	**ČSN EN ISO/IEC 17025:2018 https://www.cai.cz/?subjekt=1012-bioanalytika-cz-s-r-o**
ALS Czech Republic, s.r.o.	**PCB, perfluorinated POPs, dioxins, furans**	**ČSN EN ISO/IEC 17025:2018, https://www.cai.cz/?subjekt=1163-als-czech-republic-s-r-o**
Requirements for capacity-building on POPs monitoring in your country ? *NO*		

if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	
Does your country have the capacity to provide capacity building to other countries? *YES*	
if YES, please indicate what capacity-building your country could provide (add rows as necessary)	**CZ hosts Stockholm Convention Regional Centre at RECETOX, Masaryk University. The RECETOX supported POPs monitoring continuously since 2005. We can help/train with Sampling techniques, standard operating procedures, chemical/ laboratory analyses, design of surveys/monitoring activities and programmes, laboratory training, sample preparation, chemical analyses, data management, QA/QC. software tools for management, analysis, interpretation and visualization of environmental data, population/clinical studies and many more. since 2005 a regular "summer school course" is organized every June to support POPs monitoring worldwide. Targeted trainings for specialists but also for decision makers etc.**
Does the country have a NIP that covers also POPs monitoring? ***YES***	
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)	

see parts 3.10 and 3.11. of the updated NIP - monitoring in core media - ambient air, human breast milk, human exposure (individual and pooled, also food basket), contamination of environmental matrices - surface water, soil, sediments

POPs Monitoring (Action Plan 3.11.)
3.11.1.1
Check sampling method for determining HBCDD in EPS, i.e. method for determination HBCDD in polystyrene for the limit value of 1000ppm with a view to reduction to 500 or 100 ppm.
Responsibility: MIT
Deadline: XII/2019 Cooperation: ACI

3.11.1.2
Summarize existing monitoring activities and propose, as appropriate, monitoring of the newly listed substances.
Responsibility: National Centre
Deadline: XII/2018
Cooperation: all ministries

3.11.2.1
Provide long-term and sustainable monitoring for all POPs listed in the Annexes to Stockholm Convention in two matrices - air and breast milk. When new POPs are listed in annexes to the Convention, take it into account in the monitoring and in the Concept for monitoring and possibly consider other matrices.
The basis for long-term monitoring and its evaluation are:
current monitoring at the monitoring station in Košetice,
Optimized national monitoring network MONET_CZ for monitoring POPs in ambient air in the Czech Republic by passive sampling, long-term monitoring of breast milk and other forms of biomonitoring, integrated information system GENASIS
Responsibility: MoE
Deadline: pilot data on new POPs by end of 2018, otherwise provide a progress report to the Council of the National Centre through national inventory
Cooperation: MH, CHMI, National Centre, MA

3.11.2.2
Ensure uniform and a long-term sustainable reporting format and a continuous flow of information to the integrated information system GENASIS so that analysis of ecological and health risks and evaluation of time trends could be performed in a long term. Responsibility: MoE
Deadline: continuous activity, each year or according to sampling campaigns
Cooperation: MH, National Centre, MA, CHMI

3.10. Public awareness, education, information
3.10.2.3
Ensure the public access to the information on POPs in an acceptable and comprehensible form. As a follow up to the Strategy for POPs Monitoring and development of the data repository for interpretation and visualization of data (GENASIS) provide support to keep developing the system at its educational – training modules.
Provide a situation progress report to the Council of the National Centre each year.
Responsibility: National Centre
Deadline: continuous activity, first report X/2018
Cooperation: MoE, MH, MA

Does the country carry out research that generates data on POPs? *YES*
if yes, please provide references/citations or links to reports, reviews or publications containing further details - see below + the following selection of the most recent papers: **Holt, E., Bohlin-Nizzetto, P., Boruvkova, J., Harner, T., Kalina, J., Melymuk, L., Klanova, J.: Using long-term air monitoring of semi-volatile organic compounds to evaluate the uncertainty in polyurethane-disk passive sampler- derived air concentrations. Environmental Pollution 2017, 220, 1100-1111. Part: B** **Kalina, J., Scheringer, M., Boruvkova, J., Kukucka, P., Pribylova, P., Bohlin-Nizzetto, P., Klanova, J.: Passive Air Samplers As a Tool for Assessing Long-Term Trends in Atmospheric Concentrations of Semivolatile Organic Compounds. Environmental Science & Technology 2017, 51(12), 7047-7054** **Karaskova, P., Codling, G., Melymuk, L., Klanova, J.: A critical assessment of passive air samplers for per- and polyfluoroalkyl substances. Atmospheric Environment 2018, 185, 186-195** **Aliyeva, G., Sinnott-Clark, C. A., Audy, O., Skrdlikova, L., Kukucka, P., ; Klanova, J., Halsall, C.: A contemporary assessment of polybrominated diphenyl ethers (PBDE) in the ambient air and soil of Azerbaijan. Environmental Science and Pollution Research 2018, 25 (32), 31863-31873.** **Kalina, J., Scheringer, M., Boruvkova, J., Kukucka, P., Pribylova, P., Sanka, O., Melymuk, L., Vana, M., Klanova, J.: Characterizing Spatial Diversity of Passive Sampling Sites for Measuring Levels and Trends of Semivolatile Organic Chemicals. Environmental Science & Technology 2018, 52(18), 10599-10608.** **Urik, J., Vrana, B.: An improved design of a passive sampler for polar organic compounds based on diffusion in agarose hydrogel. Environmental Science and Pollution Research 2019, 26(15), 15273-15284.** **Vrana, B., Rusina, T., Okonski, K., Prokes, R., Carlsson, P., Kopp, R., Smedes, F.: Chasing equilibrium passive sampling of hydrophobic organic compounds in water. Science of the Total Environment 2019, 664, 424-435.** **Vrana, B., Smedes, F., Allan, I., Rusina, T., Okonski, K., Hilscherova, K., Novak, J., Tarabek, P., Slobodnik, J.: Mobile dynamic passive sampling of trace organic compounds: Evaluation of sampler performance in the Danube River. Science of the Total Environment 2018, 636, 1597-1607.**

ESTONIA

Country : ESTONIA		
contact information (contact person name + e-mail/telephone): Kristel Lopsik, kristel.lopsik@envir.ee, +372 626 2860		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***YES***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*	Passive	**number of sampling sites:** **1 (belongs to EMEP Network, Lahemaa)**

	Passive	**Industrial installations (cement factory, waste incineration), sampling done according to the permit**

POPs that are being monitored according to the National Ambient Air Monitoring Programme (7 days/20 samples per year from air and from precipitation):

1) **PCB (19 congeners): PCB 28, PCB 52, PCB 77, PCB 81, PCB 101, PCB 105, PCB 114, PCB 118, PCB 123, PCB 126, PCB 138, PCB 153, PCB 156, PCB 157, PCB 167, PCB 169, PCB 180, PCB 189, PCB 194.**
2) **Organochloro pesticides (named only POPs pesticides): HCH, endosulfan, chlordane, aldrin, dieldrin, endrin,HCBD, heptachlor, mirex, DDT, PeCB.**

Besides National Monitoring there is obligatory monitoring/sampling being carried out by different industrial installations (e.g. waste incineration plant) based on the permit requirements.

Existing capacity for POPs sampling/analysis in other media (list which media below) **YES**

HUMAN Matrices **NO**	Human Blood **NO**	WATER **YES**

other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary):

In Estonia all the national monitoring and sampling activities are being carried out on the basis on National Monitoring Programme (recently updated on the 1st of March 2019). This includes groundwater, surface water, sea, ambient air,

The information about National Monitoring Programme can be found here: https://www.keskkonnaagentuur.ee/et/seire

In Estonia, environmental monitoring is organised by the Estonian Environment Agency. Sampling is being carried out by Estonian Environmental Research Center: http://www.klab.ee/en/

Publicly available monitoring reports can be found from here (in Estonian): https://kese.envir.ee/kese/listPublicReport.action

Environmental monitoring and sampling sites can be found here (In Estonian): http://kaur.maps.arcgis.com/apps/MapJournal/index.html?appid=c0a035a83c2b4171a8f8d3bb6f1f71c9#map

Other media:

1) **Groundwater: sampling period varies between once in a year to once in every 3 years depending on the necessity. Monitoring includes pesticide residues. Sampling is done by Estonian Environmental Research Center.**

2) **Surface water (sediment, biota, water): water sampling takes place 4 times per year and from sediment and biota once in year. Monitoring interval for concrete waterbody is once every 3 years (2 monitoring rounds per 6 (water management cycle) years). Monitoring of POPs is done in most representative sampling sites in each river basin district. Monitoring of POPs is done by Estonian Environment Research Centre - http://www.klab.ee/en/. Monitoring reports and results are available in public national monitoring database KESE - https://kese.envir.ee/kese/welcome.action. Monitoring data management and status assessments is done by Estonian Environment Agency -**

<table>
<tr><td colspan="3">https://www.keskkonnaagentuur.ee/enMonitoring includes PBDE-s, HBCDD, SCCP, pesticides, HCH, PFOS, PCB. Sampling is done by Estonian Environmental Research Center.</td></tr>
<tr><td colspan="3">3) Sea (water, sediment and biota): national monitoring is being carried out in 5 regions once a year when not otherwise specified, background monitoring is being carried out once in every 3 years. Sampling is done by Estonian Environmental Research Center.</td></tr>
<tr><td colspan="3">4) Food: POPs in food are analysed in accordance with national monitoring programmes compiled and coordinated by the Veterinary and Food Board (VFB). Respective programmes and reports on non-compliant results in animals and animal products can be found on VFB webpage only in Estonian: https://vet.agri.ee/?op=body&id=823
Reports on organochloride pesticides in fruit and vegetables, babyfood and other food products can be found on VFB webpage only in Estonian: https://vet.agri.ee/?op=body&id=819.</td></tr>
<tr><td colspan="3">5) Soil: in soil monitoring programme pesticide residues are being monitored in 30 sampling sites (5 year rotation). Sampling done by Estonian Environmental Research Center.</td></tr>
<tr><td colspan="3">Existing capacity for sample treatment and POPs analysis in your country YES</td></tr>
<tr><td>if yes, please indicated how many laboratories and their location/name (add rows if necessary)</td><td>which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)</td><td>Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)</td></tr>
<tr><td>Laboratories of Health Board (Tartu, Tallinn)</td><td>OCP, PCB
POPs analysis in food and water</td><td>Yes (availability of standard operating
procedures for sampling and analyses)</td></tr>
<tr><td>Agricultural Research Centre</td><td>OCP</td><td>Yes (availability of standard operating
procedures for sampling and analyses)</td></tr>
<tr><td>Estonian Environment Research Centre (Tallinn)</td><td>Organochlorine pesticides - OCP, PCB, perfluorinated POPs, dioxins/furans.</td><td>Yes, QA/QC is in place including SOP, international intercalibration and accreditation according to ISO 17025</td></tr>
<tr><td colspan="3">Requirements for capacity-building on POPs monitoring in your country? YES (indicate what capacity strengthening would be necessary):
1) BFR, PFAS, PFOA in food
2) Biomonitoring and sample analysis
3) Soil monitoring
4) Waste monitoring</td></tr>
<tr><td>if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)</td><td colspan="2">There is need for laboratory capacity development, e.g. equipment (LC/MS/MS; GC/MS/MS), method development and validation.</td></tr>
</table>

	Increasing capacity need for carrying out human matrices analysis and biomonitoring, e.g. breast milk and other human matrices
	Improvement of soil monitoring
	Sampling and analyses from waste
Does your country have the capacity to provide capacity building to other countries? **YES**	
if YES, please indicate what capacity-building your country could provide (add rows as necessary)	**Organochlorine pesticides, PCB analyses and method development.**
Does the country have a NIP that covers also POPs monitoring? **YES**	
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)	
National Implementation Plan for Stockholm Convention was adopted in 2011 and has been updated in 2014. This year the NIP is being reviewed and its effectiveness evaluated. The first NIP and its amendment address also POPs monitoring. **All monitoring programmes have been developed by National Monitoring Programme, which also covers POPs and has been recently updated - https://www.keskkonnaagentuur.ee/et/seire - where substances, sampling matrixes, sampling sites, sampling frequencies and also requirements for carrying out monitoring work are set.** **Sampling is described on page 2.** **For contact information it is advisable to contact the government officer to specify the contact information of the responsible institution generating data, since the specialists differ. For general information regarding Stockholm Convention please contact Ms Kristel Lopsik, Senior Officer, Ministry of the Environment, kristel.lopsik@envir.ee.** **Other contacts:** **Ms Reet Talkop: Monitoring Advisor, Ministry of the Environment, reet.talkop@envir.ee** **Ms Reet Pruul: Senior Officer (Ambient Air), Ministry of the Environment, reet.pruul@envir.ee** **Mr Margus Korsjukov: Senior Officer (Ground and surface water), Ministry of the Environment, margus.korsjukov@envir.ee** **Ms Eda Andresmaa: Advisor (Sea), Ministry of the Environment, eda.andresmaa@envir.ee** **Ms Maia Radin: Bureau manager (Food), Ministry of Agriculture, maia.radin@agri.ee** **Ms Gerlin Kallas: Manager of Chemical Safety and Environmental Health (Human matrices, biomonitoring), Ministry of Social Affairs, gerlin.kallas@envir.ee.**	
Does the country carry out research that generates data on POPs? YES	
if yes, please provide references/citations or links to reports, reviews or publications containing further details **1) Test Your Environment (published on 2015 by Baltic Environmental Forum, analysed human blood and indoor dust for polybrominated flame retardants and perfluorinated compounds): https://drive.google.com/file/d/0B-pgll7dqEPXN2lZQkV4NWw0MjQ/view** **Other related information materials can be reached from: http://thinkbefore.eu/tarbija/info/** **2) Binding and interactions of heavy metals and persistent organic pollutants in soil; 1997-1998; https://www.etis.ee/Portal/Projects/Display/72062fea-ddcb-45f3-9d57-a0d092e5e6cc**	

3) **Removing biologically non-readily degradable substances from wastewater with physical-chemical and biological methods to decrease the pollution load of aquatic environment, 2012-2014; https://www.etis.ee/Portal/Projects/Display/e2fd35c6-f679-41de-81ed-f58ab0a5b3a8**
4) **„Action plan to combat emissions of Persistent Organic Pollutants in Estonia in period 2006–2010." (published in Estonian 2005, Tallinn University): https://www.etis.ee/Portal/Projects/Display/221a6b3e-316c-4bd2-9848-e423f679f4d9**
5) **„Persistent organic pollutants in environment" (published in Estonian 2008, Tartu University) https://www.etis.ee/Portal/Projects/Display/81dd6e97-4a48-40eb-9a06-851f5927bc68**

Surface water:

6) **Survey of pesticides residues and their dynamics in surfacewaters and groundwaters (2018) - https://www.envir.ee/sites/default/files/pestitsiidid_aruanne_13_04_loplik_kik_logoga.pdf**
7) **Impact assessment of hazardous substances that are harmful to aquatic environment released from oil shale industry (2017) - https://www.envir.ee/sites/default/files/polevkivitoostusest_tulevate_veekeskkonnale_ohtlike_ainete_moju_uuring.pdf**
8) **Survey of potential new European Union priority substances in Estonian surface water bodies II (2012) - https://www.envir.ee/sites/default/files/elprioriteetsete_aruanne.pdf**
9) **Study of priority substances in water, biota and sediments to ensure compliance with Council directive 2008/105 on environmental quality standards in the field of water policy (2011) (summary is also available in english) - https://www.envir.ee/sites/default/files/prioriteetsed_ained_dir105_aruanne.pdf**
10) **Screening results from project BaltActHaz (2011) - http://baltacthaz.bef.ee/files/c15/c55/Estonian%20Screening_ENG.pdf**
11) **Survey of potential new European Union priority substances in Estonian surface water bodies II (2012) - https://www.envir.ee/sites/default/files/elprioriteetsete_aruanne.pdf**
12) **Study of priority substances in water, biota and sediments to ensure compliance with Council directive 2008/105 on environmental quality standards in the field of water policy (2011) (summary is also available in English) - https://www.envir.ee/sites/default/files/prioriteetsed_ained_dir105_aruanne.pdf**
13) **Screening results from project BaltActHaz (2011) - http://baltacthaz.bef.ee/files/c15/c55/Estonian%20Screening_ENG.pdf**

Surface water biota

14) **Study of priority substances in water, biota and sediments to ensure compliance with Council directive 2008/105 on environmental quality standards in the field of water policy (2011) (summary is also available in English) - https://www.envir.ee/sites/default/files/prioriteetsed_ained_dir105_aruanne.pdf**

Groundwater:

15) **Hazardous substances survey in Quaternary groundwater bodies and in groundwater bodies close to ground (2018) - https://www.envir.ee/sites/default/files/kvaternaari_pohjaveekihtidest_moodustatud_pohjaveekogumites_ja_._ohtlike_ainete_sisalduse_uuring.pdf**
16) **Survey of pesticides residues and their dynamics in surfacewaters and groundwaters (2018) - https://www.envir.ee/sites/default/files/pestitsiidid_aruanne_13_04_loplik_kik_logoga.pdf**
17) **Hazardous substances survey in Quaternary groundwater bodies and in groundwater bodies close to ground (2013) - https://www.envir.ee/sites/default/files/oa_pohjavees_2013_aruanne-taiend.pdf**

Wastewater treatment plant influent, effluent and sewage sludge:

18) **Inventory of sources of hazardous substances that are harmful to aquatic environment (2018) - https://www.envir.ee/sites/default/files/ohtlike_ainete_inventuur/Ohtlike_ainete_inventuuri_failid.zip**

19) **Impact assessment of hazardous substances that are harmful to aquatic environment released from oil shale industry (2017) - https://www.envir.ee/sites/default/files/polevkivitoostusest_tulevate_veekeskkonnale_ohtlike_ainete_moju_uuring.pdf**
20) **Screening results from project BaltActHaz (2011) - http://baltacthaz.bef.ee/files/c15/c55/Estonian%20Screening_ENG.pdf**

Stormwater:

21) **Study of hazardous substances in stormwater (2013) https://www.envir.ee/sites/default/files/oasademevees_2013.pdf**

Seawater:

22) **Hazardous substances in seawater and seafood (research carried out during the development on National Marine Strategy, 2018, Estonian Environmental Research Center) https://www.envir.ee/sites/default/files/d8-d9.pdf**
A summary in English: https://www.envir.ee/sites/default/files/marine_status_2018_memo_25.09.2018_eng.pdf
23) **Hazardous substances in fish (research carried out in 2 phases by Estonian Environmental Research Center, 2018): https://www.envir.ee/sites/default/files/ohtlike_ainete_sisaldus_kalades_vahearuanne2_dets2018.pdf https://www.envir.ee/sites/default/files/ohtlike_ainete_sisaldus_kalades_vahearuanne2_dets2018.pdf https://www.envir.ee/sites/default/files/lisa1_toonduslikult_puutavate_kalade_analuusimaterjali_kogumise_metoodika_final.pdf**
24) **Survey on contaminants* in Fish from the Baltic Sea (published only in Estonian in 2016) (https://www.agri.ee/sites/default/files/content/uuringud/2015/uuring-2015-saasteained-kala.pdf) *dioxins, PCBs, pefluoroalkyled substances (PFAS, PFOA), organotin compounds (MBT, TBT, DBT, TPT), brominated flame retardants (PBDE), lead, cadmium, mercury, arsenic**

Ambient Air:

25) **Heavy metal, POPs and fine particulate matter emission factor from oil shale thermal production (Estonian Environmental Research Center, 2016): https://www.envir.ee/sites/default/files/rm_pos_eriheidete_aruanne.pdf**

GEORGIA

Country : Georgia		
contact information (contact person name + e-mail/telephone): Alverd Chankseliani; Alverd.chankseliani@mepa.gov.ge		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***NO***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		number of sampling sites

Existing capacity for POPs sampling/analysis in other media (list which media below) YES / NO - please choose one answer		
HUMAN Matrices **no**	Human Blood **no**	WATER **Yes** **Soil Yes**
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)		
Breast milk: **HUMAN EXPOSURE TO POPS ACROSS THE GLOBE: POPS LEVELS AND HUMAN HEALTH IMPLICATIONS RESULTS OF THE WHO/UNEP HUMAN MILK SURVEY; 2013** **Report of results: Basic POPs; PCDD/Fs; Chlordecone, HBCD; PBDE; PCBs; WHO-TEQ; Chemisches und Veterinäruntersuchungsamt Freiburg; 2010; 2015**		
Existing capacity for sample treatment and POPs analysis in your country YES / NO - please choose one answer		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (), accreditation)
Ambient Air water and soil Analyses Laboratory of the LEPL National Environmental Agency	**organochlorine pesticides-OCP**	**QA/QC in place PT**
Requirements for capacity-building on POPs monitoring in your country ? **YES** (indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	• **Renewing lab for the POPs monitoring;** • **Training the respective personnel** • **Compilation of monitoring data of POPs and priority list of monitoring data;** • **supporting/participating in international and regional POPs monitoring and research;** • **Promoting creation of POPs monitoring and research networks in Georgia;** • **Promote research on alternative chemicals, materials, products and equipment to replace and reduce the use of POPs;** • **Monitoring POPs level in POPs contaminated sites and stockpiles;** • **Monitoring the emissions and accumulation of POPs in environment and food products;** • **Bio-monitoring of human breast milk samples (in fat), defining the level of PBDEs** • **Create monitoring/control system for UPOPs (dioxins, furans, etc.) emissions**	

Does your country have the capacity to provide capacity building to other countries? **NO**	
if YES, please indicate what capacity-building your country could provide (add rows as necessary)	
Does the country have a NIP that covers also POPs monitoring? **YES**	
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)	
Decree of the Government of Georgia №247 23 May, 2018 year Tbilisi; „On Approval of Persistent Organic Pollutants National Implementation Plan 2018-2022" ***Table 11 Action plan for POPs research, development and monitoring:*** • **Renewing lab for the POPs monitoring; Training the respective personnel - Ministry of Environmental Protection and Agriculture of Georgia; Ministry of Labor, Health and Social Security of Georgia;** • **Compilation of monitoring data of POPs and priority list of monitoring data; supporting/participating in international and regional POPs monitoring and research; Promoting creation of POPs monitoring and research networks in Georgia; Promote research on alternative chemicals, materials, products and equipment to replace and reduce the use of POPs; Monitoring POPs level in POPs contaminated sites and stockpiles; Monitoring the emissions and accumulation of POPs in environment and food products; Bio-monitoring of human breast milk samples (in fat), defining the level of PBDEs - - Ministry of Environmental Protection and Agriculture of Georgia; Ministry of Labor, Health and Social Security of Georgia; Municipalities; Scientific sector.** ***Table 7 Action plan for U-POPs reduction:*** • **Create monitoring/control system for UPOPs (dioxins, furans, etc.) emissions - Ministry of Environmental Protection and Agriculture of Georgia; Private sector.**	
Does the country carry out research that generates data on POPs? **YES**	
if yes, please provide references/citations or links to reports, reviews or publications containing further details **UNIDO is implementing in Georgia GEF funded project "PCB-free electricity distribution in Georgia" management. The aim of the project is to promote the safe management of PCB-contaminated oils in the electricity distribution system of Georgia (inventory, collection, packaging, disposal, technology transfer, public awareness raising).**	

HUNGARY

Country : Hungary		
contact information (contact person name + e-mail/telephone): Ms. Fanny Nagy, fanny.nagy@am.gov.hu, +36 (1) 896 6823		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) YES		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		**number of sampling sites**

The Hungarian Air Quality Network (Országos Légszennyezettségi Mérőhálózat – OLM) is responsible for the immission monitoring of certain POPs. The monitoring covers benzo(a)pyrene, BTEX (benzene; toluene; ethylbenzene; and xylenes), besides this, from PM10 analysis OLM measures polycyclic aromatic hydrocarbons (PAHs) such as BaP, benz(a)anthracene, benzo(b, j, k)fluoranthene, benzo(b, k)fluoranthene, indeno(1,2,3-cd)pyrene, dibenz(a,h)anthracene. OLM has 54 automated non-stop measuring stations where BTEX and PM10 concentrations are being monitored, and 178 manual measuring stations where PAHs and PM10 are also evaluated. The data from the manual measuring station are published in every three months, moreover OLM also publishes annual summaries.

Emission monitoring of certain POPs covers polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDD/PCDF), polycyclic aromatic hydrocarbons (PAHs), lindane, pentachlorobenzene, polychlorinated biphenyls (PCB), hexachlorocyclohexanes, and pentachlorophenol. The data is collected from waste incinerators, vehicle manufacturers, chemical plants and companies, cement factories etc.

- PCDD/PCDF 22 sampling sites (active, yearly data)
- PAHs 16 sampling sites (active, yearly data)
- lindane 2 sampling sites (active, yearly data)
- pentachlorobenzene 2 sampling sites (passive, closed factories)
- PCB 3 sampling sites (active, yearly data)
- hexachlorocyclohexanes 2 sampling sites (active, yearly)
- pentachlorophenol 2 sampling sites (active, yearly data)

Existing capacity for POPs sampling/analysis in other media (list which media below)

HUMAN Matrices NO	**Human Blood** NO	**WATER** YES

other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)

Water and sediment: Monitoring of waters is a regular sampling, measurement, and inspection that enables the determination and characterization of the quality and quantity of surface and groundwater. The monitoring is in compliance with the requirements of the Water Framework Directive, and it is concluded by the General Directorate of Water Management (Országos Vízügyi Főigazgatóság - OVF) and the water authorities.

- aldrin 86 sampling sites (active, yearly data)
- endosulfan 61 sampling sites (active, yearly data)
- hexachlorocyclohexane 31 sampling sites (active, yearly data)
- p.p'- DDT 89 sampling sites (active, yearly data)
- dicofol 18 sampling sites (last data: 2017)
- endrin 96 sampling sites (active, yearly data)
- HBCDD 1 sampling site (last data: 2016)
- heptachlor 83 sampling sites (active, yearly data)
- hexachlorobenzene 79 sampling sites (active, yearly data)
- hexachlorobutadiene 78 sampling sites (active, yearly data)
- PCB 1 sampling site (last data: 2011)
- pentachlorobenzene 78 sampling sites (active, yearly data)
- pentachlorophenol 40 sampling sites (active yearly data)
- PFOS 1 sampling site (last data: 2016)

Some companies (like oil refineries, waste incinerators etc.) are obliged to monitor their POP emission into surface water.

- PCDD/PCDF 3 sampling sites (last data: 2015)
- endosulfan 1 sampling site (last data: 2012)
- dieldrin 2 sampling sites (last data: 2013)
- PAHs 5 sampling sites (last data: 2015)

Soil: Soil Information Monitoring (TIM) system, which is done by the National Food Chain Safety Office (Nemzeti Élelmiszerlánc- biztonsági Hivatal - NÉBIH), points provide information on the POP contamination of soils. Unfortunately, the last soil monitoring program, which focused on several POPs, was concluded in 2013, and it covered

99 sampling points and nine POPs which are listed in the Convention. These POPs are: aldrin, endosulfan, hexachlorocyclohexane, dieldrin, endrin, heptakchlor, lindane, p.p'-DDT.

Food: NÉBIH is also responsible for risk assessment of chemical pollution in foods. The institution provided us information regarding the last year's analysis of POP contamination in food.

- polychlorinated dibenzo-p-dioxins (PCDD) 121 samples
- polychlorinated dibenzofurans (PCDF) 121 samples
- PCBs: tetrachlorobiphenyl 121 samples, pentachlorobiphenyl 121 samples, hexachlorobiphenyl 121 samples, heptachlorobiphenyl 121 samples, PCB28, PCB52, PCB101, PCB138, PCB153, PCB180 130 samples (each)

Waste: The Ministry for Innovation and Technology (Innovációs és Technológiai Minisztérium – ITM) provided information for us regarding waste and some appliances like capacitors, transformers containing or contaminated with PCB.

- 130101 2 companies (2017 data)
- 130301 1 company (2018 data)
- 160109 3 companies (2016 data)
- 160209 9 companies (2018 data)
- 160210 1 company (2018 data)
- 170902 4 companies (2018 data)

Existing capacity for sample treatment and POPs analysis in your country YES

if yes, please indicated how many laboratories and their location/name (add rows if necessary)	**which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)**	**Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)**
The attached Excel file contains the requested information.		

Requirements for capacity-building on POPs monitoring in your country? YES
(indicate what capacity strengthening would be necessary)

if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	Currently Hungary is in the end phase of the implementation of Regulation (EU) 2019/1021 on Persistent Organic Pollutants. This also means that the regulation will designate the competent authorities which will be responsible for the administrative tasks and enforcement required by the Regulation. Therefore, after finishing the implementation, the competent authorities will collect the information for the inventories of certain POP substances released into air, water and land. Thus, we will have a more complete inventory of these POPs.

Does your country have the capacity to provide capacity building to other countries? NO

if YES, please indicate what capacity-building your country could provide (add rows as necessary)	**-**

Does the country have a NIP that covers also POPs monitoring? YES

If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)

Unfortunately, the last National Implementation Plan (NIP) for the Stockholm Convention was adopted in 2013. One of the main conclusions of the NIP is that the national legislative background necessary for the ban, restriction and reduction of emission of POPs are ensured, and the preparation of the NIP drew up a reliable national POP inventory. Within two years after the implementation of Regulation (EU) 2019/1021 Hungary will update its NIP.

Does the country carry out research that generates data on POPs? YES

The Department of Biotechnology at the University of Szeged carries out several researches regarding the biodegradation of environmentally harmful substances (e.g. polycyclic aromatic hydrocarbons, chlorobenzene). Moreover, the Department also does soil monitoring in which the researchers examine the impact of several pollutants on the soil's microflora. The list of the Department's recent publications:

- Perei K.; G. Rákhely, I. Kiss, B. Polyák, K.L. Kovács (2001) Biodegradation of sulfanilic acid by Pseudomonas paucimobilis. Appl. Microbiol. Biotechnol., 55: 101-107
- Magony M., I. Kákonyi, A. Gara, P. Rapali, K. Perei, K. L. Kovács, G. Rákhely (2007) Overlaps between the various biodegradation pathways in Sphingomonas subarctica SA1 Acta Biologica Hungarica 58 (Suppl.): 37–49
- K. Perei, K. Szász, Sz. Zsíros, J. Sárik, G. Rákhely and K. L. Kovács (2009) Bioremediation of Groundwater Contaminated with Chlorinated Compounds. Contaminated Site Management in Europe. Gent, Belgium October 27-29, 2009
- Laczi K, Kis Á, Horváth B, Maróti G, Hegedüs B, Perei K, Rákhely G. (2015) Metabolic responses of Rhodococcus erythropolis PR4 grown on diesel oil and various hydrocarbons. Appl Microbiol Biotechnol. 2015 Nov;99(22):9745-59. DOI 10.1007/s00253-015-6936-z
- Kis Á, Laczi K, Zsíros Sz, Rákhely G, Perei K (2015) Biodegradation of animal fats and vegetable oils by Rhodococcus erythropolis PR4. International Biodeterioration & Biodegradation. Vol. 105: 114-119
- Ágnes Erdeiné Kis, Krisztián Laczi, Szilvia Zsíros, Péter Kós, Roland Tengölics, Naila Bounedjoum, Tamás Kovács, Gábor Rákhely, Katalin Perei (2017) Characterization of the Rhodococcus sp. MK1 strain and its pilot application for bioremediation of diesel oil-contaminated soil. Acta Microbiologica et Immunologica Hungarica, December 2017, Vol. 64/4. pp 463-482.
- Hegedűs B., Kós P., Bálint B.,Maróti G., Gan H. M., Perei K., Rákhely G. (2017) Complete genome sequence of Novosphingobium resinovorum SA1, a versatile xenobiotic degrading bacterium capable of utilizing sulfanilic acid. Journal of Biotechnology 241: pp. 76-80.
- Hegedüs B, Kós PB, Bende G, Bounedjoum N, Maróti G, Laczi K, Szuhaj M, Perei K, Rákhely G Starvation- and xenobiotic-related transcriptomic responses of the sulfanilic acid-degrading bacterium, Novosphingobium resinovorum SA1. APPLIED MICROBIOLOGY AND BIOTECHNOLOGY 102:(1) pp. 305-318. (2018)
- Krisztián Laczi, Attila Bodor, Naila Bounedjoum, Katalin Perei, Tamás Kovács, Gábor Rákhely (2019) Microbial enhanced energy recovery from hydrocarbon contaminated soil and groundwater. In II: Sustainable Raw Materials. Eds G. Rákhely, C. Hodúr University of Szeged, Hungary. p. 30-32.
- Naila Bounedjoum, Attila Bodor, György Erik Vincze, Krisztián Laczi, Ágnes Erdeiné Kis, Gábor Rákhely and Katalin Perei (2019) Exploitation of extracellular organic matter from Micrococcus luteus for soil and water decontamination. In II: Sustainable Raw Materials. Eds G. Rákhely, C. Hodúr University of Szeged, Hungary. p. 47-50.
- Gábor Bende, Botond Hegedüs, Mátyás Horváth, Mónika Magony, Katalin Perei and Gábor Rákhely (2019) A unique isolate capable to eliminate xenobiotics from industrial wastewater. In II: Sustainable Raw Materials. Eds G. Rákhely, C. Hodúr University of Szeged, Hungary. p. 173-177.
- Attila Bodor, Sándor Mészáros, Péter Petrovszki, György Erik Vincze, Tibor Sipos, Máté Nagy, Naila Bounedjoum, Ágnes Erdeiné Kis, Krisztián Laczi, Gábor Rákhely and Katalin Perei (2019) Hidden reserves of oily wastes: bacterial strains from mazut can be potentially applied for oil spill bioremediation in aqueous systems. In II: Sustainable Raw Materials. Eds G. Rákhely, C. Hodúr University of Szeged, Hungary. p. 178-182.
- Katalin Perei, Ágnes Kis, Krisztián Laczi, Attila Bodor, Naila Bounedjoum, Tamás Kovács and Gábor Rákhely (2019) Efficient removal of hydrophobic materials from wastewater by Rhodococcus and Pseudomonas strains. In II: Sustainable Raw Materials. Eds G. Rákhely, C. Hodúr University of Szeged, Hungary. p. 186-190.
- Attila Bodor, Sándor Mészáros, Péter Petrovszki, György Erik Vincze, Tibor Sipos, Máté Nagy, Naila Bounedjoum, Ágnes Erdeiné Kis, Krisztián Laczi, Gábor Rákhely and Katalin Perei (2019) Hidden reserves of oily

wastes: bacterial strains from mazut can be potentially applied for oil spill bioremediation in aqueous systems. In II: Sustainable Raw Materials. Eds G. Rákhely, C. Hodúr University of Szeged, Hungary. p. 178-182.

- Naila Bounedjoum, Attila Bodor, György Erik Vincze, Krisztián Laczi, Ágnes Erdeiné Kis, Gábor Rákhely and Katalin Perei (2019) Exploitation of extracellular organic matter from Micrococcus luteus for soil and water decontamination. In II: Sustainable Raw Materials. Eds G. Rákhely, C. Hodúr University of Szeged, Hungary. p. 47-50.
- Bodor A, Naila Bounedjoum, György Erik Vincze, Ágnes Erdeiné Kis, Krisztián Laczi, Gábor Bende, Árpád Szilágyi, Tamás Kovács, Katalin Perei, Gábor Rákhely, (2020) Challenges of unculturable bacteria: environmental perspectives. Reviews in Environmental Science and Bio/Technology DOI 10.1007/s11157-020-09522-4
- Andrea Farsang, Katalin Perei, Adrienn Kézér, Benjamin Pálffy, Károly Barta, Katalin Csányi, Zsuzsanna Ladányi (2019) Impact of sewage sludge disposal on bacterial activity, nutrient and heavy metal content of Chernozem soils, Southeastern Hungary GEOPHYSICAL RESEARCH ABSTRACTS 21 Paper: EGU2019-15854 , 1 p.
- Bodor A, Naila Bounedjoum, György Erik Vincze, Ágnes Erdeiné Kis, Krisztián Laczi, Gábor Bende, Árpád Szilágyi, Tamás Kovács, Katalin Perei, Gábor Rákhely, (2020) Challenges of unculturable bacteria: environmental perspectives. Reviews in Environmental Science and Bio/Technology DOI 10.1007/s11157-020-09522-4

KAZAKHSTAN

Country : Republic of Kazakhstan		
contact information (contact person name + e-mail/telephone): Assel Intymakova, a.intymakova@energo.gov.kz +7-701-733-73-39		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***No***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		number of sampling sites
Existing capacity for POPs sampling/analysis in other media (list which media below) Yes		
HUMAN Matrices **No**	Human Blood **No**	WATER **Yes**
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)		
Existing capacity for sample treatment and POPs analysis in your country **Yes**		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)

3 complex laboratories of the branch of RSE "Kazhydromet" in North Kazakhstan region, Almaty, East Kazakhstan region.	**organochlorine pesticides: dichlorodiphenyltrichloroethane; alpha hexachlorocyclohexane. Also, RSE "Kazhydromet" analyzes dichlorodiphenyldichloroethane; alpha hexachlorocyclohexane; gamma hexachlorocyclohexane. Also, RSE "Kazhydromet" analyzes dichlorodiphenyl dichloroethane**	**in accordance with Article 144 of the Environmental code, the analysis of the content of pollutants in the selected samples of surface water is carried out by accredited chemical analytical laboratories, in accordance with the methods of measurements entered in the state register of the Republic of Kazakhstan. Complex laboratories of RSE "Kazhydromet" in North Kazakhstan region, Almaty, East Kazakhstan region are accredited for compliance with GOST**
Requirements for capacity-building on POPs monitoring in your country ? **YES** (indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	**1. Establishment of a chemical analytical laboratory focused on the tasks of the Stockholm Convention on POPS,** **In Kazakhstan today there is no laboratory for the determination of dioxins and furans. However, in fulfilling the obligations of the Republic of Kazakhstan under the Stockholm Convention to monitor emissions of dioxins and furans, there is a need for periodic analysis of unintentional emissions of enterprises. In addition, the establishment of a POPs destruction facility (pesticides with POPS properties, PCB-containing equipment) in the territory of the Republic of Kazakhstan requires the control of dioxins and furans emissions. In this regard, it is necessary to create a dioxin laboratory, which could also work for the entire Central Asian region.** **2. Monitoring and compiling an annual register of dioxin and furan emissions should be carried out by industrial enterprises with the assistance of a dioxin laboratory.** **3. Biomonitoring for the presence of POPS** **4. Monitoring of POPS in blood and breast milk**	
Does your country have the capacity to provide capacity building to other countries? **NO**		
if YES, please indicate what capacity-building your country could provide (add rows as necessary)		
Does the country have a NIP that covers also POPs monitoring? **YES**		
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)		
In Kazakhstan, the issue of monitoring POPS emissions is extremely acute. The system of continuous monitoring of POPS, including new POPS, has not been established in Kazakhstan. **Monitoring of environmental pollution of the Republic of Kazakhstan is carried out by the state network of environmental observations of RSE "Kazhydromet" - subordinated organization of the Ministry of energy.**		

Monitoring data are published in periodic reviews of the state of the environment based on observations on the monitoring network. However, the definition of chemicals that are POPS is not carried out by RSE "Kazhydromet" on the whole territory of Kazakhstan. **According to the Environmental Code of the Republic of Kazakhstan, environmental users are obliged to carry out industrial environmental control, the element of which is production monitoring. However, the list of substances subject to industrial environmental control and monitoring is limited and does not include POPS.** **Identification and monitoring of hazardous chemicals, including POPS, in consumer goods (toys, dishes, packaging, paints, cosmetics, etc.) is completely absent. As a rule, the technical documentation for products does not contain requirements for the definition of hazardous chemicals with the properties of persistent organic pollutants. Accordingly, there is no complete picture of the use of products containing POPS.** **As can be seen, there is no systematic monitoring of POPS in the environment and consumer goods in Kazakhstan. However, some data on the content of POPS in different media are available in the scientific literature and in individual studies and projects.**
Does the country carry out research that generates data on POPs? **YES**
if yes, please provide references/citations or links to reports, reviews or publications containing further details

According to the Global monitoring of POPS, POPs pesticides such as HCB, PCB, DDT, beta-HCH, lindane, of which PCBs, beta-HCH and lindane are new POPS pesticides have been found in Atyrau and Borovoe resort areas.

In 2009-2010, the Ministry of environmental protection (now the Ministry of energy of the Republic of Kazakhstan) together with the world Bank developed a project in which 4 foci of potential POPs pesticides and new POPS pesticides were investigated. As a result of the research it was found:

- in zhetekshi village of Pavlodar region, the concentrations of HCB and gamma-HCH exceed the norms established for the protection of human health in the pesticide Warehouse and in the pesticide dump in Kalkaman village of Pavlodar region;

- in the Derzhavin Agricultural complex of Akmola region and in the pesticide warehouse in the Village №7 of Pavlodar region, the levels of POPS did not exceed the norm, which is a potential threat.

Within the framework of the program 039 "Development of hydrometeorological monitoring" subprogram 100 "Environmental monitoring" branch of RSE "Kazhydromet" in North Kazakhstan region since 2014 monthly conducts determination of pesticide concentration (alpha -, gamma-HCH, 4,4 – DDT and 4,4 – DDE) on 2 water bodies (Esil river and sergeyevskoye reservoir).

In 2015 in the framework of the scientific-technical program "Integrated approaches in health management in the Aral sea basin", studies have been conducted to determine the residual quantities of organochlorine pesticides, polychlorinated biphenyls, dioxins in the soil layer of soil and bottom sediments of the five districts of Kyzylorda region: p. Ayteke Bi, p. Zhosaly, Aral, Zhalagash p., p. Shiely. Organochlorine pesticides were detected in four localities of the 5 – p. Zhosaly, Zhalagash p., p. Ayteke Bi, p. Siili. The greatest pollution by organochlorine pesticides 12 out of 22 samples – 54.5% was registered in Zhosaly, where 10 samples of gamma-HCH and 2 samples of DDT were found.

In 2016, RSE "Kazhydromet" conducted studies of pesticide content (alpha -, gamma-HCH, 4,4 – Ddti 4,4 – DDE) in the surface waters of the rivers Ile, Tekes, Khorgos, Kara-Ertis and Emel during the growing season (June, July, August). According to the results of the analysis of pesticides alpha -, gamma-HCH, 4,4 – DDT and 4,4 – DDE in the samples of selected water samples were absent.

MUNI | RECETOX

Based on an agreement concluded between UNDP and the Centre for the Study of Toxic Substances in the Environment, Faculty of natural Sciences, Masaryk University in Brno, Czech Republic (RECETOX), a study was conducted in 2016 based on the sampling of air and soil samples and their laboratory analyses for the presence of POPS for environmental monitoring in Kazakhstan. As a result of studies on POPS pesticides, the following has been established:

- the highest level of HCH was detected at the Atyrau weather station;

- DDT was detected as well as HCH at all sampling sites.

Monitoring BUT POPS

With the financial support of the project "Initial assistance to the Republic of Kazakhstan to fulfill the obligations under the Stockholm Convention on POPS" in the Bashkir Republican research environmental center, the analysis of atmospheric air samples for the content of dioxins and furans was carried out.

According to studies the high content of PCDD/PCDF in the copper smelter plant mining and metallurgical plant in Balkhash town and in close proximity to the sinter machine at the plant “Mittalsteel Temirtau”, and the atmospheric air in the sanitary-protective zone of JSC "Ust-Kamenogorsk titanium magnesium plant" in relation to dioxin pollution conform to the norms.

As part of a study conducted by RECETOX in 2016, the following was revealed in the part of NOH POPS:

- the highest levels of PCDD/f were found in samples from the Kyzylorda weather station;

- the highest levels of pollution from dioxin-like polychlorinated biphenyls were in the cities of Atyrau and Kyzylorda.

Monitoring of industrial POPS

As a result of research of RECETOX in 2016, the following was established in terms of industrial POPS:

the most PCB-contaminated area was the meteorological station of Ust-Kamenogorsk;

- air pollution with pentachlorobenzene was the same at all sampling sites, and hexachlorobenzene levels were one order of magnitude higher.

Thus, to date, Kazakhstan does not have a comprehensive system for monitoring POPS, including new POPS, in the environment and products. Accordingly, insufficient measures are taken to identify and monitor POPS in the environment and finished products, as well as the impact of POPS on human health and the environment.

№	NGO	The name of the document
1	Arnika	«Toxic Pollutants in camel milk from the Mangystau Region of Kazakhstan», Prague – Aktau 2016
2	Arnika, Экомузей	«Места загрязнения токсичными веществами» Прага – Караганда 2015
3	Recetox	Обзор текущей ситуации по мониторингу СОЗ в окружающей среде в Казахстане и зарубежом, 2012 г. Иван Холубек, Яна Кланова, Антон Кочан
4	Recetox	Структура предлагаемой сети по мониторингу стойких органических загрязнителей (СОЗ) в Казахстане, 2012 г. Иван Холубек, Яна Кланова, Антон Кочан
5	Recetox	Review of the Current Situation in Laboratory Capacities for the Analysis of Polychlorinated Biphenyls in the Republic of Kazakhstan, Антон Кочан

6	Greenwomen Эко-форум Наурзум Экомузей	Обзор ситуации с СОЗ в Казахстане
7	Эко-Согласие	Новые стойкие органические супертоксиканты и их влияние на здоровье человека, 2016 г. Амирова З.К., Сперанская О.А.
8	IPEN	Основа для действий по защите здоровья человека и окружающей среды от опасных пестицидов, Джек Вейнберг
9	IPEN	Пестициды: Угроза реальна. Москва, 2004 г.
10	SNC - LAVALIN	Казахстан: проект по предлагаемой локализации и удалению ПХД и устаревших пестицидов. Итоговый отчет, 2011 г.

LATVIA

Country : Latvia		
Judite Dipane, phone +371 67 026 415, e-mail: judite.dipane@varam.gov.lv		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***YES***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		number of sampling sites
State limited Liability Company "Latvian Environment, Geology and Meteorology Centre", in general can provide most of analysis to determinate POPs; however, it depends on the national environmental monitoring. Yes, in laboratory is system for data quality.		
Institute of Food safety, Animal Health and Environment "BIOR", in general can provide most of analysis to determinate POPs,, however, it depends on the environmental monitoring of state. Yes, in laboratory is system for data quality.		
Existing capacity for POPs sampling/analysis in other media (list which media below) ***YES***		
HUMAN Matrices **N**	Human Blood **N**	WATER **Y**
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)		
The following matrices could be analyzed in BIOR: soil, sediments, sludge, food, aquatic biota		
Existing capacity for sample treatment and POPs analysis in your country ***YES***		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)

Institute of Food Safety, Animal Health and Environment "BIOR	**OCPs, PCBs, PCDD/Fs, PBDEs, PBBs, HBCDDs, PFAS, PCNs, TBT, chlorinated paraffins**	**Routine QA/QC procedures have been introduced:** • **SOPs for sampling and analysis;** • **Participation in PTs for: OCPs, PCDD/Fs, PCBs, PFAS, HBCDDs, PBDEs, TBT, chlorinated paraffins** **Accreditation of all testing method in flexible scope according to the ISO 17025 by LATAK (Latvian National Accreditation Bureau)**
State limited Liability Company "Latvian Environment, Geology and Meteorology Centre"	**most of analysis to determinate POPs, it depends on the national environmental monitoring**	**Yes, in laboratory is system for data quality**
Requirements for capacity-building on POPs monitoring in your country ? ***YES*** (indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	**Further implementation of high resolution mass spectrometry for the analysis of POP is necessary** **For many POP groups no information available in different environmental media** **Broader official monitoring programs and support from relevant authorities needed**	
Does your country have the capacity to provide capacity building to other countries? ***YES***		
if YES, please indicate what capacity-building your country could provide (add rows as necessary)	**On-site training (in Latvia and in foreign countries) for the sample treatment, analysis and interpretation of results**	
Does the country have a NIP that covers also POPs monitoring? ***YES***		
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)		
State monitoring programs: air quality monitoring, water quality monitoring, national program on maximum residue levels of pesticides in or on food and feed of plant and animal origin		
Does the country carry out research that generates data on POPs? ***YES***		
if yes, please provide references/citations or links to reports, reviews or publications containing further details		
Selected publications: **https://pubs.acs.org/doi/abs/10.1021/es401852d** **https://www.sciencedirect.com/science/article/pii/S0021967316314261** **https://www.sciencedirect.com/science/article/pii/S0045653515305762** **https://www.sciencedirect.com/science/article/pii/S0048969717333053** **https://www.tandfonline.com/doi/abs/10.1080/19440049.2015.1136436** **https://www.sciencedirect.com/science/article/pii/S0308814619312051**		

Existing national monitoring programme/ activity/ dataset	Matrix	Laboratories and Institutions involved in sampling	Laboratories and Institutions involved in POPs analysis	Involvement of intl. & reg. Programmes/ data accessibility	Time frame
All parametrs including POPs can be found in State limited Liability Company "Latvian Environment, Geology and Meteorology Centre" home page	**Water Sediment Biota**	**State limited Liability Company "Latvian Environment, Geology and Meteorology Centre"**	**State limited Liability Company "Latvian Environment, Geology and Meteorology Centre"; Institute of Food safety, Animal Health and Environment "BIOR**	**n.a**	**It depends on parameter**

LITHUANIA

Country : LITHUANIA		
Contact information (contact person name + e-mail/telephone): AURELIJA BAJORAITIENE, Chief Specialist, Pollution Prevention Policy Group, **Ministry of Environment** of the Republic of Lithuania, phone number: +370 706 63502, e-mail: aurelija.bajoraitiene@am.lt		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) *YES / NO - please choose one answer*		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		**number of sampling sites**
Environmental Protection Agency		
Active (high volume)		5
Passive[1]		1
The **State Research Institute, Center for Innovative Medicine** has used high volume and passive sampling devices from partner Institute (Kaunas University of Technology and Center for Physical Sciences and Technology).		
	High volume aerosol sampler Digitel AG, DH-77 and PM2.5 cyclone URG Inc., USA.	4
Existing capacity for POPs sampling/analysis in other media (list which media below) ***YES*** */ NO - please choose one answer*		
HUMAN Matrices **Y**/N	**Human Blood** Y/N	**WATER** **Y**/N
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)		
Analysis of POPs are carried out of bottom sediment, soil, sludge and biota of inland surface water, Curonian Lagoon and the Baltic Sea. Analysis are performed by the **Environmental Protection Agency**, Department of Environmental Research. Soil, sediment, sludge – organochlorine pesticides, PCB, BDE; biota - organochlorine pesticides.		

Existing capacity for sample treatment and POPs analysis in your country *YES* / *NO - please choose one answer*		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	**which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)**	**Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)**
Environmental Protection Agency Environmental Research Department Chemical Research Division, A.Gostauto str. 9, Vilnius, Lithuania	POPs in water: Organochlorine pesticides* (Aldrin, dieldrin, DDT, endrin, HCB, heptachlor, Mirex, toxaphene, a-endosulfan, b-endosulfan, a, b, g-HCH, pentachlorobenzene), PCB, BDE (BDE-47,BDE- 99, BDE-153, BDE-154), PFOS POPs in sediment, soil, sludge: Organochlorine pesticides (Aldrin, dieldrin, DDT, endrin, HCB, heptachlor, Mirex, toxaphene, a-endosulfan, b-endosulfan, a, b, g-HCH, pentachlorobenzene), PCB, BDE (BDE-47, 99, 153, 154). POPs in ambient air**: PAHs (B(a)P in PM 10, Benzo(a)anthracene in PM 10, Benzo(b)fluoranthene in PM 10, Benzo(k)fluoranthene in PM 10, Indeno(1,2,3,-cd)pyrene in PM 10, Dibenzo(a,h)anthracene in PM 10).	Quality management system is implemented in the Department – the Department is accredited according to standard LST EN ISO/IEC 17025. Laboratory participates in PT programmes. *Determination of organochlorine pesticides in water is under scope of accreditation. **Determination of PAHs in ambient (PM10) is under scope of accreditation.
Environmental Protection Agency Environmental Research Department Chemical Research Division, Taikos av. 26, Klaipėda, Lithuania	POPs in water: Organochlorine pesticides (Aldrin, dieldrin, DDT, endrin, HCB, heptachlor, a-endosulfan, b-endosulfan, a, b, g-HCH, pentachlorobenzene), PCB. POPs in sediment, soil, sludge: Organochlorine pesticides (Aldrin, dieldrin, DDT, endrin, HCB, heptachlor, a-endosulfan, b-endosulfan, a, b, g-HCH, pentachlorobenzene), PCB. POPs in biota: Organochlorine pesticides (Aldrin, dieldrin, DDT, endrin, HCB, heptachlor, a-endosulfan, b-	Quality management system is implemented in the Department - the Department is accredited according to standard LST EN ISO/IEC 17025. Laboratory participates in PT programmes.

	endosulfan, a, b, g-HCH, pentachlorobenzene).	

[1] *THIS WORK IS CARRIED OUT WITH THE SUPPORT OF CORE FACILITIES OF RECETOX RESEARCH INFRASTRUCTURE, PROJECT NUMBER LM2015051, FUNDED BY THE MINISTRY OF EDUCATION, YOUTH AND SPORTS OF THE CZECH REPUBLIC UNDER THE ACTIVITY „PROJECTS OF MAJOR INFRASTRUCTURES FOR RESEARCH, DEVELOPMENT AND INNOVATIONS"*

MONTENEGRO

Country : Montenegro		
contact information (contact person name + e-mail/telephone): Danijela Šuković, deputy director in Centre for Ecotoxicological Research- danijela.sukovic@ceti.co.me, phone: +382 20 658-090 Jelena Kovacevic, Head of Department for industrial pollution control and chemicals, Ministry for Sustainable Development and Tourism, jelena.kovcevic@mrt.gov.me +382 20 446 237		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) YES		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*	***For POPs ambient air sampling we use high-volume sampling device***	**number of sampling sites** **There is not obligation in our country to measure PCB in ambient air. Through some project CETI made sampling of POPs in ambient air**
Existing capacity for POPs sampling/analysis in other media (list which media below) *YES*		
HUMAN Matrices Y	Human Blood Y	WATER Y
Soil Matrices Y	Sediment Matrices Y	Food Matrices Y
Feed Matrices Y	Waste Matrices Y	
In accordance with Environmental Low (Official Gazette. N_0 52/16) the Agency for Nature and Environmental Protection shall designate one or more reference laboratory (accredited in accordance with MEST EN ISO / IEC 17025) for the implementation of monitoring programs (air, soil, seawater, waste). Center for ecotoxicological research Podgorica (CETI) is only reference laboratory for POPs monitoring in all segments of environment. **CETI is only authorized laboratory in Montenegro (from Food Safety Authority) for POPs monitoring in food and feed.** **The list of accredited laboratories and the scope of accreditation of all testing laboratories is available on the website: http://www.akreditacija.me/reg.php#**		
Existing capacity for sample treatment and POPs analysis in your country *YES*		

if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)
Center for Ecotoxicological Research	**Organochlorine Pesticides (Aldrin, Chlordane, DDT, Dieldrin, Aldrin, Heptachlor, Hexachlorobenzene (HCB), Mirex, Endosulfan, , Alpha hexachlorocyclohexane, Beta hexachlorocyclohexane, Lindane),Polychlorinated biphenyls (PCB), PCDD/PCDF Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride-PFOS**	**1)Center for Ecotoxicological Research is accredited laboratory according ISO/IEC 17025. 2) Annual plan for conducting interlaboratory/proficiency testing; 3) Participation in interlaboratory testing carried out by certified EU provider in accordance with international standards (ISO / IEC 17043: 2010, ILAC P13: 10/2010, ISO / IEC 17011), as well as other relevant international organizations;**
Institute of Public Health	**Organochlorine Pesticides**	**IPH is accredited laboratory according ISO/IEC 17025.**
Requirements for capacity-building on POPs monitoring in your country ? *YES* (indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)		
Hexabromodiphenyl ether and heptabromodiphenyl ether; Tetrabromodiphenyl ether and pentabromodiphenyl ether Hexabromocyclododecane (HBCDD)	**Strengthening of professional capacities in CETI for new POPs chemical analysis Strengthening of technical capacities in CETI for new POPs chemical analysis**	
Does your country have the capacity to provide capacity building to other countries? *YES*		
if YES, please indicate what capacity-building your country could provide (add rows as necessary)	**Sampling and analysis of Organochlorine Pesticides (Aldrin, Chlordane, DDT, Dieldrin, Aldrin, Heptachlor, Hexachlorobenzene (HCB), Mirex, Endosulfan, , Alpha hexachlorocyclohexane, Beta hexachlorocyclohexane, Lindane),Polychlorinated biphenyls (PCB) in soil, water and food as well as Perfluorooctane sulfonic acid, its salts and perfluorooctane sulfonyl fluoride-PFOS in water**	
Does the country have a NIP that covers also POPs monitoring? *Yes*		

If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)
Updated National plan for implementation of Stockholm convention with the Action plan for period 2019-2023, the Goverment of Montenegro adopted in July 2019. **The Ministry of Sustainable development and Tourism will be responsible for submitting the two-year report to the Government, while data needed for reporting on the degree on implementation of the measures within its competences will be provided by the entities which implement activities i.e. representatives of competent authorities within the working group: Nature and Environment Protection Agency of Montenegro, Administration for Inspection Affairs, Ministry of Agriculture and Rural Development/Administration for Food Safety, Veterinary and Phytosanitary Affairs, Ministry of Labour and Social Welfare, Ministry of Health, Ministry of Economy, Ministry of Interior, University of Montenegro and Centre for Eco-toxicological Research. The report will posted on website of the Ministry.**
In April 2019, the Regulation on the manner and deadlines for determining the status of surface waters (Official Gazette of Montenegro 25/19) was adopted, prescribing the manner and deadlines for determining the status of surface waters, the manner of monitoring the chemical and ecological status of surface waters, a list of priority substances and measures to be taken to improve the status of surface waters. Moreover, the monitoring is carried out by systematic monitoring of the status of waters to determine the status of water on the basis of the program covering all water areas. The monitoring program includes for: **1) surface waters: volume and water level or flow to a level that is significant for ecological and chemical status and ecological potential; ecological and chemical status and ecological potential;** **2) groundwater: chemical and quantitative status;** **3) protected areas: includes data of importance for protected areas in accordance with the document on the protection of those areas.** **The monitoring may also include the supervisory monitoring, which is carried out in order to obtain data for monitoring long-term changes in water status; operational monitoring, conducted to determine the status of water bodies that have been identified as being at risk of failure to meet environmental objectives; and research monitoring, which is carried out in order to determine the reasons for changing status of water bodies. The water monitoring is performed by the Institute for Hydrometeorology and Seismology.**
For 2017 the presence of dioxins and furans was analyzed in 16 soil samples. In the absence of an appropriate national legal framework defining the permitted values of these pollutants in different types of land, by categories of their use, the results obtained were compared with the values prescribed by EU legislation. Consequently, all dioxin/furan values obtained by soil monitoring in 2018 were much lower than those prescribed by EU regulation. Therefore, each of the soil samples tested for dioxin/furan content was safe from the point of being used as recreational land, residential land, sports grounds, playgrounds, agricultural land.
Rulebook on the maximum level of residues of the plant protection products on or in plants, plant products, food or animal feed (Official Gazette of Montenegro 21/15, 44/15) regulates maximum levels of residues of the plant protection products (pesticides) on/in the plants or plant products, food or animal feed, as well as the plants and plant products, food or animal feed for which maximum level of pesticides are established, for the purpose of protecting consumers and monitoring pesticide residues. The maximum levels of pesticide residues are specified in the said Rulebook. **Pursuant to the Law on Food Safety (Official Gazette of Montenegro 57/15) and with reference to Article 10 of the Law on Plant Protection Products (Official Gazette of Montenegro 51/08 and 18/14), the Ministry of Agriculture and Rural Development, with the consent of the Ministry of Health, adopted the Programme for monitoring pesticide residues in the food of plant and animal origin (Official Gazette of Montenegro 10/19). The Programme sets out the requirements and methods of monitoring, methods of control, conditions, manner and methods of taking and storing samples, keeping records on samples and methods of laboratory testing for the purpose of monitoring the level of pesticide residue. The programme aims to assess threat to the population health and implementation of the legislation, in accordance with the levels of pesticide residues set out in the Rulebook on the maximum level of residues of the plant protection products on or in the plants, plant products, food or animal feed (Official Gazette of Montenegro 21/15 and 44/15). Samples of food intended for infants and young children shall be evaluated on products ready for use or prepared according to the manufacturer's instructions, taking into account the maximum residue levels laid down in the Regulation on the manner and conditions for the placing on**

the market of food for particular nutritional uses (Official Gazette of Montenegro 10/17). If such food can be consumed as a finished product and as a product for preparation, results for the finished product shall be provided. **In accordance with Program of safety measures for food and feed safety (Officila Gazzete 08/19), monitoring programs of contaminants in food and feed have been established.** **Regulation on maximum permitted limits of contaminants in food (Official Gazzete 48/16) sets maximum levels of PCB, Dioxine like PCB and dioxine in food.** **Regulation on maximum permitted limits of undiserable substances in feed (Officila Gazete 36/18) sets maximum levels of organochlorine pesticides and dioxins in feed.**
responsible institution generating data, contact person and his/her contacts (add rows below as necessary)
Directorate for food safety , veterinary and phytosanitary affairs is institution responsible for generating data of food and feed monitoring programs
Nature and Environment Protection Agency of Montenegro is institution responsible for generating data of air, soil, seawater monitoring programs
Does the country carry out research that generates data on POPs? *NO*
if yes, please provide references/citations or links to reports, reviews or publications containing further details

NORTH MACEDONIA

Country: Republic of Macedonia		
Contact information (contact person name + e-mail/telephone): Trajče Stafilov, trajcest@pmf.ukim.mk; Tel: +389 70 350756		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***NO***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		number of sampling sites
Existing capacity for POPs sampling/analysis in other media (list which media below)		
HUMAN Matrices **NO**	Human Blood **NO**	WATER **YES**
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary) **Soil NO** **Sediment NO** **Food and Feed PARTLY** (The laboratory within the Institute of Public health is accredited for determination of pesticides residues in fruits and vegetables, but the HCH isomers are not included. Moreover, there are technical capacities for determination of HCH isomers in eggs, milk, meet, but the relevant methods are not accredited; The Phytosanitary Laboratory at the Institute of Agriculture is accredited for determination of nine organochloride pesticides in plants oil; The Laboratory at the Primary Health Care can analyze five organochloride pesticides in mill products and pulpy fruit juice.)		

Existing capacity for sample treatment and POPs analysis in your country ***YES***		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)
Institute of Public Health at the city of Skopje	**OCP**	
Phytosanitary Laboratory at the city of Skopje	**OCP**	
Faculty of Veterinary Medicine; at the city of Skopje	**OCP**	
Primary Health Care; at the city of Bitola	**OCP**	
Requirements for capacity-building on POPs monitoring in your country? **YES** (indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)		
Completion of the laboratory with the necessary equipment for sampling and analysis of POPs		
Facilitating the accreditation procedure for methods related to the POPs analysis in different matrices		
Provision of the laboratory equipment needed for sampling for analysis of POPs		
Training of the staff handling and operating with the equipment		
Establishment of laboratory network and startup with regular POPs analysis		
Does your country have the capacity to provide capacity building to other countries? **NO**		
if YES, please indicate what capacity-building your country could provide (add rows as necessary)		
Does the country have a NIP that covers also POPs monitoring? ***YES***		
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)		
Establishment a system for eco bio-monitoring (2018-2024; Scientific institutions, Ministry of Health, Ministry of Environment and Physical Planning)		

Establishment of National laboratory for monitoring and analysis of the POPs (2018-2021; Ministry of Environment and Physical Planning, Ministry of Health)
Does the country carry out research that generates data on POPs? ***NO***
if yes, please provide references/citations or links to reports, reviews or publications containing further details

POLAND

Country: Poland		
contact information (contact person name + e-mail/telephone): Monika Sklarzewska, Senior Specialist, Ministry of Climate, Department of Waste Management, +48 22 36 92 418, monika.sklarzewska@klimat.gov.pl		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***NO***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*		number of sampling sites
Not applicable.		
Existing capacity for POPs sampling/analysis in other media (list which media below) ***YES***		
HUMAN Matrices N	Human Blood N	WATER Y
BOTTOM SEDIMENTS Y	BIOTA Y	SOIL Y
FOOD Y		
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)		
Existing capacity for sample treatment and POPs analysis in your country ***YES***		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)
All information is included in Polish NIP, point 3.4 Research, development and monitoring, page 45. A referred version of NIP originates from 2015 thus a major part of data is from before 2015. The next update of Polish NIP will include new monitoring data. The monitoring system of POPs, as presented in the NIP, has not changed since 2015 and must be considered as actual. The institutions listed in point 3.4 still participate in the monitoring of POPs.		

Requirements for capacity-building on POPs monitoring in your country ? ***YES*** (indicate what capacity strengthening would be necessary)	
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	There is a need to develop the list of monitoring POPs substance, which are not covered by Polish NIP. See also page 21-22. In table 1 there is the maximum permissible concentrations of POPs in the individual environmental components and in feeds.
Does your country have the capacity to provide capacity building to other countries? ***NO***	
if YES, please indicate what capacity-building your country could provide (add rows as necessary)	Not applicable.
Does the country have a NIP that covers also POPs monitoring? ***YES***	
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)	
All information is included in Polish NIP, available: https://archiwum.mos.gov.pl/fileadmin/user_upload/odpady/Odpady_niebezpieczne/Update_of_the_NIP_SC_Poland.pdf. Monitoring activities: p. 45 Media and sampling sites: p. 46, 3.4.2 Monitoring results Responsible institution: page 25-26. We have not such detailed information as contact person and his/her contacts.	
Does the country carry out research that generates data on POPs? ***YES***	
if yes, please provide references/citations or links to reports, reviews or publications containing further details A lot of information contains Polish National Implementation Plan, available: https://archiwum.mos.gov.pl/fileadmin/user_upload/odpady/Odpady_niebezpieczne/Update_of_the_NIP_SC_Poland.pdf Research: page 45 of Polish NIP.	

Existing national monitoring programme/ activity/ dataset	Matrix	Laboratories and Institutions involved in sampling	Laboratories and Institutions involved in POPs analysis	Involvement of intl. & reg. Programmes/ data accessibility	Time frame
Information regarding available data concerning Existing national Monitoring programme/ activity is available https://archiwum.mos.gov.pl/fileadmin/user_upload/odpady/Odpady_niebezpieczne/Update_of_the_NIP_SC_Poland.pdf					

ROMANIA

Country : Romania
contact information (contact person name + e-mail/telephone): Alin Danca/ danca.alin@mmediu.ro /+40753507764

Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***YES***		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*	High volume sampler from filters for PM10 located in 6 zones defined for air quality assessment.	number of sampling sites 6(six)
Existing capacity for POPs sampling/analysis in other media (list which media below) ***NO***		
HUMAN Matrices **N**	Human Blood **N**	WATER **Y**
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)		
Groundwaters - in 2017, a total of 141 bodies of water were monitored at 550 monitoring points, for a number of 21 pesticides, including the following persistent organic pollutants: DDT, Lindan, Aldrin, Dieldrin, Endrin, delta-hexachlorocyclohexane. **Organizations carrying the work: "Romanian Waters National Administration''**		
Existing capacity for sample treatment and POPs analysis in your country ***NO***		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)
Requirements for capacity-building on POPs monitoring in your country ? ***YES***(indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	-Sampling(air/water) -Analysis(air/water)	
Does your country have the capacity to provide capacity building to other countries? ***NO***		
if YES, please indicate what capacity-building your country could provide (add rows as necessary)		

Does the country have a NIP that covers also POPs monitoring? ***YES***
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)
Monitoring of POPs in rivers and lakes located in the vicinity of landfills and industrial sites, periodic inventory updating and monitoring of unintentional emissions of persistent organic pollutants and monitoring POPs contaminated soil.
Does the country carry out research that generates data on POPs? ***NO***
if yes, please provide references/citations or links to reports, reviews or publications containing further details

RUSSIAN FEDERATION

Country : Russian Federation		
contact information (contact person name + e-mail/telephone): Zarema Amirova, z.amirova2014@yandex.ru +7-917-470-68-51, Pavel Shirokov +7 (499) 254 -8601 spn@mnr.gov.ru		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***Yes***		
if yes, please indicate if active (*highvolume or another sampler and/or passive (add rows if necessary)*		number of sampling sites
active (high-volume/another sampler)	**4(FMBA)+4(Rosgidromet)+ 2(MIT)+82 (Rospotrebnadzor)+ 1(ME RB)**	**4 (FMBA)+ two monitoring stations in 2015-2017 in the Arctic (Amderma, Tiksi) + 3 (Baikal) 2014/2016 +1 (Obninsk) (Rosgidromet), +306(2014), 202(2015), 88(2016), 6(2017),48(2018) (Rospotrebnadzor)**
passive sampler (Resetox or anothe)r	**15(FMBA)+6(Rosgidromet) + 6(ME RB)**	**15 (FMBA)+ 3 (Baikal) 2014/2016 (Rosgidromet)+1(RB)**
Existing capacity for POPs sampling/analysis in other media (list which media below) Yes		
HUMAN Matrices - **Yes**	Human Blood - **Yes**	WATER **Yes**

Rospotrebnadzor **Ministry of Health** **Federal Medical and Biological** **Agency of Russia (FMBA of Russia)** **Rosselkhoznadzor** **Research Institutes of the Russian Academy of Sciences/ Ministry of Education and Science (RAS/MES)** **ME RB (ERPC)**	**Ministry of Health** **FMBA of Russia** **ME RB(ERPC)** **Rosselkhoznadzor** **Research Institutes of the Russian Academy of Sciences/ Ministry of Education and Science (RAS/MES)**	**Rosgidromet** **FMBA of Russia, Ministry of Industry and Trade of the RF (MIT), Rospotrebnadzor** **Rosselkhoznadzor** **Municipal water treatment enterprises of Russian cities (Vodokanal)** **ME RB (ERPC, UGAK) and Vodokanal-Ufa)** **Research Institutes of the RAS/MES**

Soil **Yes**	Sediment **Yes**	Animal tissue **Yes**
Rosgidromet, **Rosselkhoznadzor** **FMBA, MIT,** **Rospotrebnadzor,** **Ministry of Environment of the Republic of Bashkortostan (ME RB) (ERPC, UGAK - State Analytical Control Department)**	**FMBA of Russia,** **Rosgidromet, MIT,** **Rosselkhoznadzor,** **RB (ERPC, SACD),** **Research Institutes of the RAS/MES**	**Rospotrebnadzor** **Institutes of the Ministry of Agriculture,** **Federal Fishery Agency,** **Rosselkhoznadzor,** **ME RB (ERPC),** **Research Institutes of the RAS/MES** **Laboratory of NPO "Typhoon",** **Roshydromet**
plants **Yes**	food **Yes**	emissions - **yes**
Rosselkhoznadzor	**Rospotrebnadzor**	**Rosgidromet, MIT, Rosatom**
Research Institutes of the RAS/MES	**Rosselkhoznadzor**	**RB (ERPC)**

other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)
Existing capacity for sample treatment and POPs analysis in your country - ***Yes***

if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)
Laboratory of Physical and Chemical Research (LFHI) **FSUE STC RCBG FMBA Russia, Moscow**	**OCP, PCB, dioxins/furans, brominated POPs**	**LFHI is accredited by the Federal Accreditation Service of Russia and the body of the ILAC/ ARLAC (2016), intercal. UNEP (2016, 2018), InterCinD**

Laboratory Federal State Unitary Enterprise "State Research Institute of Organic Chemistry and Technology" (FSUE "GosNIIOKHT", Moscow	HCB, HCH (α,β,γ), (water), PCBs, PCDD/Fs (soil, sediments)	national accreditation РОСС СОБ 7.00175.2019
Branch of FSUE State Research Inst. Chem. Technology (GosNIIOKHT) , "Shikhans" Saratov region	PCBs (emissions, working area air)	national accreditation РОСС СОБ 7.00188.2014
Branch of FSUE SRI Chem. Technology(GosNIIOKHT), detached factory No. 4, Novocheboksarsk	sampling, ambient air, emission	national accreditation РОСС СОБ 7.02812.2015
Federal State Unitary Enterprise "Mayak" of Rosatom State Corporation, testing laboratory Chelyabinsk region, Ozersk	HCBD in air	№ РОСС. RU.0001.519043, accreditation system of ROSATOM. Control of the working area
82 laboratories FBUZ "Center for Hygiene and Epidemiology in the regions of the Russian Federation in all federal districts.	DDT, HCH (isomers) PCBs	The management system is implemented, all laboratories are accredited in Rosakkreditatsiya, there is a system of laboratory control and quality management
32 laboratories Federal state budgetary institutions subordinated to the Rosselkhoznadzor	OCP, DDT, HCH (isomers) PCBs	Availability of the sampling procedure. Availability of the analysis procedure Accreditation in national and international accreditation systems
Laboratory of NPO "Typhoon", Roshydromet, Obninsk	OCP, PCBs, PCDD/Fs, PBDE...	QA / QC are implemented. Accreditation of Russia for sampling and analysis. Participation in national and international tests in the NCP, AMAP, UNEP, InterCIND systems. Database UNEP lab POPs
3 laboratory in Republic of		

Bashkortostan: (ERPC until 2016), Ufa Vodokanal (2016-2019), Ufa UGAK (2016-2019), Ufa	OCP, dl- PCB, PDDD/Fs, PBDE (1995-2916) OCP (water) OCP (soil), PAH (air)	National accreditation РОСС RU.0001.510275, methods USEPA 1613, 16681, 1614, EN 1948. ISO 17025-2009, intercal. (Umea, NILU, UNEP-2014) РОСС RU.0001.151171, intercal. РОСС RU.0001.510312, monitoring license
Requirements for capacity-building on POPs monitoring in your country? - *YES* (indicate what capacity strengthening would be necessary)		

if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	
FMBA Russia, Ministry of Health	**It is required to increase the number of competent laboratories performing analysis of POPs in the human environment (air, water, soil) in food and bioassays, equipped with modern analytical equipment, methodical provision of new methods for measuring POPs, state standards of the constantly growing POPs -list.**
Rospotrebnadzor, Ministry of Health	**Development of methods of control and hygienic standards Priorities: food and drinking water, atmospheric air**
Rosselkhoznadzor, Ministry of Agriculture	**In accordance with the International Code of Conduct on the Distribution and Use of Pesticides (FAO, WHO), the authority responsible for controlling pesticides in a country should be defined. It is advisable to determine the Rosselkhoznadzor as the responsible authority in the field of pesticide control**
Ministry of Environment of the Republic of Bashkortostan (ME RB)	**1.Upgrading equipment lab level 1 in Bashkiria: GC gas and liquid, GC / MS high resolution, automated sample preparation equipment (recommendations of UNEP) 2. Harmonization of POPs analysis methods with international ones, development of new POPs analysis methodologies (PFOA, etc.) 3. Biomonitoring for the presence of POPS 4. Monitoring of POPS in blood and breast milk**
Does your country have the capacity to provide capacity building to other countries? - ***Yes***	
if YES, please indicate what capacity-building your country could provide (add rows as necessary)	**FMBA. Conduct international interlaboratory testing to ensure uniformity of measurements and improve the quality of the analysis of POPs Rospotrebnadzor. The implementation of standards and methodologies for the control of food products in the Technical Regulations of the Customs Union (ECE) Rosselkhoznadzor. Methodical assistance and laboratory research. ME RB. Methodological and experimental support for monitoring POPs (Kazakhstan)**
Does the country have a NIP that covers also POPs monitoring? - ***YES***	
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)	
There is no special GMP- POPs program in Russia but there is section 5 of the National Implementation Plan for the Stockholm Convention. In the near future, there are: 1. "Monitoring the content of toxic polychlorinated biphenyls in the human environment" (2017-2020) Rospotrebnadzor and the Ministry of Education and Science of Russia within their budgets, 2. "Organization in the constituent entities of the Russian Federation of monitoring the state of public health in	

connection with exposure to persistent organic pollutants" (2018-2020). They are carried out by the executive authorities of the interested subjects of the Russian Federation at the expense of their budgets.

In the long term (2021-2028), it is planned within the framework of the State program "Protection of the population and territories from emergency situations, ensuring fire safety and the safety of people on water bodies":

3. **"Organization of monitoring of persistent organic pollutants in the framework of state monitoring of the state and environmental pollution" (2021-2028), Roshydromet**
4. **Organization of epidemiological and research and biomonitoring in areas contaminated by POPs, and the rationale for the reference levels of their content in human biological media, taking into account the effect on offspring (20212028). Performers: Ministry of Health, Rospotrebnadzor.**
5. **Comparative risk assessment of persistent organic pollutants and their substitutes and justification of hygienic standards for persistent organic pollutants and their substitutes in environmental objects (soil, water, atmospheric air) taking into account international requirements (2021-2028). Contractor - Rospotrebnadzor**

However, the list of substances subject to industrial environmental control and monitoring is limited and does not include new POPs. OCP is monitored for a long time and regularly, but in non-priority environments for GMP (water, snow, foodstuffs ..). Most of the work on new POPs, as well as dioxin-like compounds, was carried out in high-risk areas, which reduces significance for background monitoring.

FMBA: Monitoring of POPs (ratified by the Russian Federation) in environmental objects (air, water, soil), foodstuffs). Focal point: NCC RF on the fulfillment of the obligations of the RF provided by the SC on POPs.

Does the country carry out research that generates data on POPs? - ***YES***

if yes, please provide references/citations or links to reports, reviews or publications containing further details

State monitoring data (Roshydromet, NPO Typhoon) are published in periodic reviews of the state of the environment based on observations on the monitoring network.
Some data on the content of POPS in different media are available in the scientific literature and in individual studies and projects.

Referance	Main results (site, POPs, level)
Surveys of the state and pollution of the environment in the Russian Federation for 2015-2017.	**Generalized data for the regions of Russia, OCP, PCB**
Federal statistical observation form No. 18 "Information about the sanitary condition of the subject of the Russian Federation (annual)	**Section 3 - water bodies, section 4 - atmospheric air, section 5 - soil, section 8 - food products.**
State report "On the state of sanitary and epidemiological well-being in the Russian Federation (annual)	**Generalized data for the regions of Russia, OCP, PCB**

Report "Persistent Organic Pollutants in the Baikal Natural Territory" pt1, 2014, pt.2. - 2016	As part of the work on the Federal Target Program "Protection of Lake Baikal and the socio-economic development of the Baikal Natural Territory for 2012–2020", in 2015–2016, work was carried out to select and analyze samples of various environmental objects. PCDD/Fs, dl-PCBs, I-PCB, OCP, toxaphene, PBDEs in air, soil sediments, biota.
D. Samsonov and others. The content of persistent organic pollutants in the components of the unique ecological system of the lake. Baikal - Meteorology	PCDD/Fs, dl-PCBs, I-PCB, OCP, toxaphen, PBDEs in air, soil sediments, biota.
and Hydrology, 2017, №5, 105-115.	
A.Boltunov et al. Persistent organic pollutants in the Pechora Sea walrus. - Polar Biology, 2019, 1-11.	Samples of skin and subcutaneous tissues from 15 adult males in the Pechora Sea and from 1 adult female from adjacent White Sea during the years 2011–2017 were analyzed for PCBs, PBDEs, and OCPs. The highest concentrations were found for PCBs. PBDEs showed the lowest concentrations: 13 ± 6.5 ng g^{-1} lipid; range 0.7–104 ng g^{-1} lipid, *n* = 16).
The pollution of the bottom sediments in the north-western part of the Caspian sea hydrocarbons and persistent organic pollutants. Ostrovskaya E.V. Samsonov D.P et. al. The South of Russia: ecology, development. №4, 2014, №4, 129-131	The paper presents the analyses of polluted sediments north-western part of the Caspian Sea, also considered persistent organic pollutants (POPs). Aim. The pollution of the bottom sediments in the north-western part of the Caspian sea hydrocarbons and persistent organic pollutants. Methods. The materials for this article are based on the results of monitoring conducted in 2012-2013 years. Results. Sediments in the north-western part of the Caspian Sea as a whole slightly contaminated POPs, although localized areas of high pollution are marked, especially characteristic of the Middle Caspian.
Annual state reports on the state of natural resources and the environment in the Republic of Bashkortostan, 2014-2015. Section "Special types of environmental impact. Pollution with dioxins and other persistent organic pollutants".	Monitoring PCDD/F and dl-PCB in soil, air, water, human blood, breast milk, food. The main volume of data in Bashkiria was obtained in 20002014. A decrease in the content of dioxins in the blood of the population of Ufa by 10% over 10 years was shown (9 pg/g of lipids compared to a cohort of Ufa workers - up to 400 pg/g of lipids. The level of soil contamination in residential quarters was low as 1-3 pg TEQ_{2005}/ g d.w. compared to pollution of the industrial zone - up to 10,000 pg/g d. w.
Z.K. Amirova, A.A. Kulagin. Persistent organic compounds in the atmospheric air of urbanized territories of Russia (POPs monitoring by passive sampling).- Ufa: Ed. Open Science Publishing, Luly Press, Inc., USA. 2018. 224 p.	The analysis of the application of the method of passive sampling Reset ox, supplemented by research in Russia. The content of dioxins in the air of polluted industrial zones of Ufa and the cities of Bashkortostan, Chapayevsk ranged from 0.15 pg /m3 to 388 pg /m3 (industrial area), 2014.
Galimova EF, Amirova ZK, Galimov SN. (2015) Dioxins in the semen of men with infertility. Environ Sci Pollut Res Int. v. 22, n.19, p.p. 14566- 14569.	The concentration of dioxins in the seed (12 pg / g of lipids) is compared in terms of reproductive health. 2013

1. List of POPs data available in your country

Existing national monitoring programme/ activity/ dataset	Matrix	Laboratories and Institutions involved in sampling	Laboratories and Institutions involved in POPs analysis	Involvement of intl. & reg. Programmes/ data accessibility	Time frame
Measurement of air pollution by dioxins in Moscow	***ambient air***	**FSUE STC RCBG FMBA Russia**	**FSUE STC RCBG FMBA Russia**		**2014-2018**
Determination of PCDD and PCDF in river and drinking water samples in the city of Moscow	***in river and drinking water***	**Waterworks Mosvodokanal**	**FSUE STC RCBG FMBA Russia**		**2014-2018**
Ministry of Industry: research, industrial environmental control	***water, air, soil, sediments***	**State Research Inst. Chem. Technology Branch "Shikhans" Branch of FSUE SRI**	**State Research Inst. Chem. Technology Branch "Shikhans"**		**periodically** **constantly**
		Chem. Technology, detached factory No. 4			**constantly**
Ministry of Health Rospotrebnadzor database	**water, air, soil, food**	**Center for Hygiene and Epidemiology by Subjects of the Russian Federation**	1. **Federal Scientific Institution "Federal Scientific Center for Hygiene named after Erisman Rospotrebnadzor** 2. **Federal Budget Health Institution «Russian Register of Potentially Hazardous Chemical and Biological Substances" of Rospotrebnadzor of Russia**		**2011-2018**
	soil	**Federal state budgetary institutions subordinated to the Rosselkhoznadzor**	**Federal state budgetary institutions subordinated to the Rosselkhoznadzor**		**2011-2019**
Federal Target Program "Protection of Lake Baikal"	**ambient air, water, soil, biota**	**Limnological Institute SB RAS**	**NPO "Typhoon" Roshydromet**		**2014-2018**
-	**ambient air**	**NPO "Typhoon" Roshydromet**	**NPO "Typhoon" Roshydromet**	**AMAP**	**2015-2017**
Municipal agreement, Obninsk city	**ambient air**	**NPO "Typhoon" Roshydromet**	**NPO "Typhoon" Roshydromet**		**2015-2017**
Surveys of the state and pollution of the environment in the Russian Federation	**soil, OCP**	**NPO "Typhoon" Roshydromet**	**NPO "Typhoon" Roshydromet**		**2015-2018**

"Monitoring programs for transboundary water bodies of the Caspian Sea for 2012-2014" (Roshydromet).	**PCBs (station n=20), OCP, HCB, HCH, DDT (n=21) in marine *sediments***	**NPO "Typhoon" Roshydromet**	**NPO "Typhoon" Roshydromet**		**2014**
Municipal POPs Program in the soil of Ufa	**PCDD/Fs and dl-PCBs in soil of city Ufa**	**BSPU named after M. Akmulla, Ufa**	**ME - ERPC**		**2014-2015**
State task of the Ministry of Environment of the Republic of Bashkortostan in the field of environmental objects	**OCPs, PCBs, PCDD/Fs in soil, water, sediments, air, snow**	**ME - ERPC ME-UGAK**	**ME - ERPC ME-UGAK**		**2014-2018**
The work program of laboratory and production control of the enterprise	**OCP, PCB in river water**	**Vodocanal -Ufa**	**Vodocanal -Ufa**		**2014-2016**
Monitoring of PCDD / F and PCB in the blood and breast milk of the population of Ufa and the Republic was performed in the period 1997-2014. Available - archive ERPC. (Amirova Z. Results of biomonitoring in a dioxin pollution risk zone in Ufa (1996-2014) Organohal. Comp. 76, 1089-1091, 2014)					

 # 2. List of POPs data available in your country

Additional information on the analytical definitions of POPs according to the scientific publications of Russian authors

2.1. Studies of air pollution of POPs, including PCBs, in Siberia have been conducted by teams of research institutes of the Siberian Branch of the Russian Academy of Sciences in recent years (Tarasova et. al., Mamontova E., Kuzmin, 2014-2018).

2.2. Among the works on long-term biomonitoring, we can mention the results of the determination of dioxins and dlPCB and PBDE in the blood of the population of Russian cities.

- The longitudinal study of the international team in Chapayevsk is well known (Sergeyev O, Burns JS, Williams PL, Korrick SA, Lee MM, Revich B, et al. 2017, The association of peripubertal serum concentrations of organochlorine chemicals and blood lead with growth and pubertal development in a longitudinal cohort of boys: a review of published results from the Russian Children's Study. Rev Environ Health 32(1-2):83-92.).
- Samples of bioassays (blood, breast milk) are accumulated during project implementation and stored in a biobank. Quality control procedures are followed. (Information from O.Sergeev, head of the Epiginetic Epidemiology Group, Moscow State University).
- The purpose of some works was cohort studies of highly exposed people, but residents' samples were used as controls in Irkutsk (Chernyak Y.) and Ufa (Amirova Z.).
- For the first time, a study was conducted of the content of PBDEs in the blood of the population (Chapaevsk, 2015, n = 51, RNF grant 14-45-00065b O. Sergeev, A. Shelepchikov). http://rscf.ru/prjcard/?rid=14-45-00065

2.3. Measurements of POPs in the blood of residents of the Russian Arctic (AMAP programs) are currently being continued by research teams based on grants - DDT, HCH, PCB in Murmansk population n=50, 2014. (Dudarev V., project KolArctic, 2014, AMAP, 2015).

New research teams are currently conducting research on the basis of the Northern (Arctic) University in the city of Arkhangelsk (T. Sorokina and others, 2018-2019, serum, population of Nenets district).

In the Far Eastern Federal University, the content of HCH and DDT in the blood plasma of residents of Vladivostok (n = 21) was determined by V. Tsygankov and others (2015), in blood and urine (2019).

2.4. POPs studies are conducted under grants from the Russian Science Foundation or similar. For the period 2014-2019 published data on the content of POPs:

- in the muscles and organs of reindeer (PCDD / F, dl-PCB, Makarov D. et. al. 2018, VNIKI, Rosselhoznadzor, M.),
- fish, mollusks, seabirds, cetaceans (PCBs, OCPs, Tsygankov V., 2018. Far Eastern Federal University, Vladivostok)
- in rodents, fish, bottom sediments of contaminated areas near Moscow (PCDD/F, Rumak V. 2014-2016).

2.5. Studies of POPs (included new POPs) in the Neva River were carried out under the international project "Balthazar". Comprehensive survey of St. Petersburg (water of the Neva River, soil, etc.) - project Balthazar (2012).

2.6. Monitoring of OCPs, PCBs in water, sediments, mesoplankton, fish and dolphins from the Black Sea bays is carried out at the Institute of Marine Biological Research of the Russian Academy of Sciences, Sevastopol, Malakhova (20152018). There is an experience of PCDD/F evaluation in bottom sediments of Sevastopol bays (Amirova Z. 2018).

2.7. **Lake Baikal study program**

Currently, Baikal studies are carried out by the structures of the Ministry of Natural Resources and Ecology of the Russian Federation, the Ministry of Science and Higher Education of the Russian Federation, and academic institutions of the Russian Academy of Sciences. For example, the works of the Limnological Institute of the SB RAS by definition of
PCB_7 (Gorshkov A. et al., 2015-2017) in bottom sediments and Baikal fish are known
There is a project of the Irkutsk Scientific Center of the Siberian Branch of the Russian Academy of Sciences on the organization of digital monitoring within the framework of the National Program "Ecology" (Federal Project "Conservation of Lake Baikal"). The indicated implementation dates are 2019-2024. It is intended to cover 93% of the area of the Baikal natural territory with state environmental monitoring. Directly issues of monitoring POPs are not highlighted.

2.8. **Laboratories and Institutions involved in POPs analysis.**

Additional information about laboratories and equipment performing analytical studies of POPs in Russia.

1. In Bi-ennial Global Interlaboratory Assessment on Persistent Organic Pollutants – Third Round 2016/2017 six russian laboratories took part:

- Analytical Center for Water Quality Control ROOSA 7-35, Rodnikovaya str. Moscow 119297 Russia
- Center of Environmental Control Olimpiyskaya 32 Volgograd 400051 Russia
- Centre for Environmental Chemistry, Spa Typoon (Agency SI FRPA "Typhoon") 55 ,fl 12, Marksa ave Obninsk, Kaluga Region 249035 Russion Federation
- IGCE - Institute of Global Climate and Ecology Roshydromet and RAS (IBMoN OPL) Glebovskaya street 20-B Moscow 107258 Russia
- Industrial ecology Leninskiy pr-t, 65k1, office 818 Moscow 119991 Russia
- Research and Technical Center of RadiadionChemical Safety and Hygiene Federal Medical Biological Agency of Russian Federation 40, Shchukinskaya str. 123182 Moscow

2 In UNEP DATABANK of laboratories analyzing persistent organic pollutants

"POPS LABORATORY DATABANK" there are two Russian laboratories (Http://Labs.Pops.Int/Laboratory/Search.Aspx)

Centre for Environmental Chemistry of SPA "Typhoon"	Russian Federation
Research and Technical Center of Radiation-Chemical Safety and Hygiene Federal Medical Biological Agency of Russia	Russian Federation

3. There is a private network of analytical laboratories (about 20 large laboratory centers and laboratories certified to take air samples and environmental objects and analyze them, including some POPs (www.airgk.ru, GC "Laboratory")

4. According to the project "Modern Research Structure of the Russian Federation", the Federal Catalog of Collective Use Centers (CUC) was created, site "Scientific and technical infrastructure of the Russian Federation: centers for the collective use of scientific equipment" (www.ckp-rf.ru).
Of the 306 CUC on site 211 are geosciences, they can potentially perform monitoring work of various levels.
Currently in the Russian Federation there are 41 scientific organizations of the status of the scientific center of the Russian Federation of various types, including
• FSBI "Actual and Antarctic Institute", St. Petersburg, Roshydromet www.aari.ru
• FSBI Institute for Medical Problems, Russian Academy of Sciences, Minnauki, www.imbi.ru
• FSBI "Hydrometeorological Center" Roshydromet/

Abbreviations

MNR - Ministry of Natural Resources and Environment
RFR - Russian Foundation for Basic Research
RSF - Russian Science Foundation
MHR - Ministry of Health
Rospotrebnadzor - The Federal Service for Consumer Protection and Human Welfare (Ministry of Health) MAR - Ministry of Agriculture
Rosprirodnadzor - The Federal Supervisory Natural Recourses Management Service
MIT - Ministry of Industry and Trade
Rosgidromet - Russian Federal Service on Hydrometeorology and Environmental Monitoring
Rosribolovstvo - The Federal Agency for Fishery of the Russian Federation.
ME RB - Ministry of Environment and Ecology of the Republic of Bashkortostan

SERBIA

Country : Republic of Serbia		
contact information (contact person name + e-mail/telephone): Mr. Ivan Djurickovic, National Stockholm Convention Contact Point, Independent Adviser, Department for Chemicals, Ministry of Environmental Protection e-mail: ivan.djurickovic@ekologija.gov.rs Phone: +381 11 7155 203		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) ***YES***		
if yes, please indicate if **active** (*high-volume or another sampler and/or passive (add rows if necessary)*	**Passive, using passive air samplers**	number of sampling sites **4 (passive samplers)**

List of organizations accredited for sampling and analysis of POPs concentrations in air:

Accredited organisation	Types of analysis	Method
SP Laboratory AD, Beĉej	Determining concentrations of PCB	SRPS EN 1948-3:2009
	Determining concentrations of PAH	SRPS ISO 11338-2:2010
Institute of Public Health Belgrade	Determination of total (gas and particle-phase) PAH	SRPS ISO 12884:2010
Institute "Vatrogas" Ltd, Laboratory, Novi Sad	Determination of gas and particle-phase PAH	SRPS ISO 12884:2010 SRPS ISO 11338-2:2010
"Anahem" d.o.o, Laboratory, Belgrade	Emissions from stationary source of pollution- Determination of the mass concentration of PCDDs/PCDFs and dioxin-like PCBs	SRPS EN 1948-1:2009
"Mol AD", company for chemistry, biotechnology and consulting	Determining the concentrations of PCB	EPA M 8082 A: 1996

Existing capacity for POPs sampling/analysis in other media (list which media below) ***YES***

List of accredited organisations for analysis of POPs concentrations in waters:

Accredited organisation	Types of analysis	Method
SP Laboratory AD, Beĉej	Determining residues of organochlorine pesticides	SRPS EN ISO 6468:2008
	Determination of PAH	ISO 28540:2011
Institute of Public Health Војводине	Determination of PAH	EPA M 525.2
	Determination of polychlorinated byphenils (PCB 1, PCB 5, PCB 29, PCB 47, PCB 98, PCB 154, PCB 171, PCB 201)	EPA M 525.2
Institute of Public Health Kragujevac Centre for Hygiene and Human Ecology	Determination of concentrations of organochlorine pesticides	EPA M 8081 B
`	Determining concentrations of PCB	EPA M 8082 A
	Determining concentrations of PAH	EPA M 8270 C
Institute of Public Health Vranje	Determining concentrations of PCB Determining concentrations of pesticides (aldrin, dieldrin, DDT, heptachlor, heptachlorepoxide, lindane)	Standard methods of testing of hygienic safety, Federal Institute for Health Protection, Belgrade, 1990
	Determining residues of pesticides in waste waters	SRPS H.Z1.200:1992

Institute of Public Health Sabac	Determination of organochlorine pesticides in drinking water	EPA 508.1:1995
Institute of Public Health Užice Centre for Hygiene and Human Ecology	Determination of organochlorine pesticides	EPA M 8081B
Institute of Public Health Belgrade	Determination : PAH, PCB and organochlorine pesticides	EN 15527; EN 15308; US EPA M 8081
	Determination of organochlorine pesticides and PCB	ISO 10382:2002
	Determination of PCDD and PCDF	EPA M 8290A
	Determination of PAH	ISO 18287:2006
Institute of Public Health "Pomoravlje" uprija	Determination of aromatic and chlorinated easily volatile organic compounds	SMEWW method 6200 C
	Determining concentrations of PCB	SMEWW method 6431 B
	Determining concentrations of organochlorine pesticides: (Aldrin, Dieldrin; *o,p´*- DDT *p,p´*- DDT)	SMEWW method 6630 B
Institute of Public Health Ĉaĉak Centre for Hygiene and Human Ecology	Determining concentrations of organochlorine pesticides: Aldrin, Dieldrin, Lindane, Heptachlor, Heptachlor-epoxy, DDT	EPA 508.1
Institute of Public Health Nis Centre for Hygiene and Human Ecology	Determining concentrations of PCB and organochlorine pesticides:	EPA 505
"Mol AD", company for chemistry, biotechnology and consulting	Determining concentrations of PAH	EPA 550.1: 1990
	Determining concentrations of organochlorine pesticides:	EPA M 8081 B: 1998
"NIS Naftagas" Novi Sad	Determining concentrations of PCB in water	SRPS EN ISO 6468:2008
MD Project Institute Nis, Laboratory for measuring emission, noise, waste waters in environment	Determining concentrations of PAH	EPA 8100
Holding Company: Institute of General and Physical Chemistry jsc Analysis, Research and Development Laboratory	Determination : PAH, PCB and e pesticides	EPA 8270 D : 1996
Occupational Health and Safety Institute, Novi Sad	Determining PAH	SRPS EN ISO 17993:2008
	Determination of 2,3,7,8-tetrachloro-dibenzo-*p*-dioxin	EPA 613:1984

	Determination of pesticides	SRPS H.Z1.200:1992
	Determining concentrations of PCB	SRPS EN ISO 6468:2008
Holding Company Occupational Health and Safety and Environmental Protection, Belgrade, Laboratory for environmental protection	Determining concentrations of PCB	EPA 8270 C:1996 EPA 3510:1996
	Determining concentrations of PAH	EPA 8270 C:1996 EPA 3550C:2007
	Determining concentrations of organochlorine pesticides	EPA 8270 C:1996 EPA 3510:1996
Anahem holding company, Laboratory Belgrade	Determining concentrations of semi volatile organic substances: PAH and PCB	EPA 525.2/625:1994
Knjaz Milos, share company, Knjaz Milos, Aranjdelovac	Determining of organochlorine pesticides, PAH and PCB	EPA 525.2 и 625.2.
Serbian Environmental Protection Agency	Determining the concentrations of semi volatile organic compounds in waters and sediment and α-HCH, β-HCH, γ-HCH, pentachlorobenzene, hexachlorobenzene, heptachlor, aldrine, endrine, dieldrine, p,ṕ'-DDE, p,ṕ'-DDT, p,ṕ'-DDD, p,ṕ'-endosulfan, chlordane, Determination of congers of polychlorinated byphenils PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153, PCB-180, PCB-194	EPA 8270D:2007
	Determining the concentrations of semi volatile organic compounds in waters and sediment II -Fluoranthene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benzo(ghi)perilene, naphtalene, acenaphthylene,acenaphthene, fluorene, phenantrene, anthracene, pyrene, dibenzo(a,h)anthracene, benzo(a)anthracene, chrysene, pentachlorophenol	EPA 8270D:2007

HUMAN Matrices Y/N	Human Blood Y/N	**WATER YES/N**

other media **- soil,** sediment**, food**… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary)

List of accredited organisations for analysis of POPs concentrations in soil

Accredited organisation	Types of analysis	Method
SP Laboratory AD, Beĉej	Determining concentrations of organochlorine pesticides: Aldrin; Chlordane; Endrin; Dieldrin; Heptachlor ; 1,4,4- DDE; 4,4-DDD; 2,4,4 -DDT	ISO 10382:2002
	Determining concentrations of PAH	EPA 3540 C :1996, 3630 C: 1996, 8081 A: 1996

Institute of Field and Vegetable Crops, Soil and Agro ecology Laboratory, Novi Sad	Determining concentrations of PCB	EPA 3540 C: 1996, 3630 C: 1996, 8082 A: 2007
"Mol AD", company for chemistry, biotechnology and consulting,	Determining concentrations of PCB	EPA M 8082 A: 1996
	Determining concentrations of PAH	EPA M 550.1:1990
	Determining concentrations of organochlorine pesticides (Lindan, aldrine, dieldrin, endrin, heptachlor, DDT)	EPA M 8081 B :1998
Institute of Public Health, Belgrade	Determination of PAH	ISO 18287:2006
	Determination of PAH, PCB and organochloric pesticides	EN 15527; EN 15308; EPA M 8081
	Determination of PCDD and PCDF	EPA M 8290A
	Determination of organochloric pesticides and PCB	ISO 10382:2002
Holding company: Institute of General and Physical Chemistry jsc Analysis, Research and Development Laboratory	Determination of PCB, PAH and pesticides in soil and sediment	EPA M 8270 C : 1996
Anahem holding company, Laboratory Belgrade	Determination of concentrations of semi volatile organic substances: PAH	EPA M 3550C,3540C/8270D:1998
Institute of Public Health "Pomoravlje" uprija	Determination of easily volatile aromatic, PAH, PCB and pesticides in soil and sediment	EPA M 8100
Occupational Health and Safety Institute, Novi Sad	Determination of PAH concentrations in soil and sediment	BS EN 15527:2008
Holding Company Occupational Health and Safety and Environmental Protection, Belgrade, Laboratory for environmental protection	Determining concentrations of PCB	EPA 8270C EPA 3350C
	Determining concentrations of PAH	EPA 8270 C:1996 EPA 3550C:2007
	Determining concentrations of organochlorine pesticides	EPA 8270 C:1996 EPA 3550C:2007
Institute “Vtrogas” d.o.o Laboratory Novi Sad	Determination of PAH	EPA M 8275A

List of accredited organisations for analysis of POPs concentrations in food

Accredited organisation	Types of analysis	Method
Centre for Food Analysis, Belgrade	Determining concentrations of organochlorine pesticides	AOAC 970.52, 983.21, 984.21, 985.22
SP Laboratory AD, Beĉej	Determining concentrations of organocholine pesticides and PCB	SRPS EN 1528-4:2008
Institute of Public Health Belgrade	Determination of pesticides and PCB	SRPS EN 1528-2:2008
	Determination of PAH	EPA M 610
Institute of Public Health Kragujevac, Centre for Hygiene and Human Ecology	Determining concentrations of organochlorine pesticides	EN 15662
Institute of Public Health Sabac	Determination of organochlorine pesticides	EN 15054:2006; SRPS EN 1528-3:2008

Institute of Public Health Timok, Zajecar, Centre for Hygiene and Human Ecology	Determination of organochlorine pesticides	EPA M 8081A
Institute of Public Health, Vojvodina	Determining residues of pesticides (α- HCH, β-HCH, lindan, δ-HCH, DDE, DDD, DDT, heptachlor, heptachlor epoxide, aldrine, dieldrin, endrin)	BS EN 15662:2008
Jugoinspekt Beograd AD, Topĉider Institute, Laboratory for Food Quality and Safety Analysis	Determination of organochlorine pesticides (HCH, HCE, aldrine, DDT and derivates) and PCB	Documented Method 29 JUP 010102-34
Institute of Meat Hygiene and Technology, Laboratory sector	Determination of organochlorine pesticides and PCB	02R.01.001 (ref. document)
Occupational Health and Safety Institute, Novi Sad	Determination of organochlorine pesticide residues	AOAC Official Method 2007.01
	Determination of pesticides and PCB	SRPS EN 1528-2:2008
Company "Knjaz Milos" jsc Laboratory "Knjaz Milos", AranĊelovac	Determination of PCB	AOAC Official Method 2007.01
Institute of Public Health Ĉaĉak Centre for Hygiene and Human Ecology	Determination of concentrations of organochlorine pesticides aldrine, dieldrin lnindan, heptachlor, heptachlorperoxide, DDT, DDD, DDE, endosulfan, α HCH, β HCH, γ HCH	BMK 008 (ref. document)
Institute of Public Health of Serbia “dr Milan Jovanovi-Batut”, Belgrade	Determination of organochlorine insecticides and PCB	AOAC 970.52 - Modified method
Institute of Public Health Užice, Centre for Hygiene and Human Ecology	Determination of organochlorine pesticides	EPA M 508
Institute of Public Health "Pomoravlje" uprija	Determination of pesticides (aldrine, dieldrine, endrine, lindan (γ-BHC), endosulfan I, endosulfan II, heptachlor, heptachlorperoxide isomer A, heptachlorperoxide isomer B, chlodrane *o,p´*- DDT, *p,p´*- DDT, *p,p´*- DDE; mirex, hehachlorbenzen, hexachlorocyclohexane	Manual "Pesticides in Food": Standard methods for the determination of pesticide residues in food
Institute of Public Health Nis Centre for Hygiene and Human Ecology	Determining concentrations of organochlorine pesticides	Manual "Pesticides in Food": Standard methods for the determination of pesticide residues in food Part II, C3333, 1989.
ltd. "Alfa lab", company providing laboratory services	Determining concentrations of organochlorine pesticides (α-BHC, β-BHC, γ-BHC, δ-BHC, heptachlor, aldrine, heptachlor-oxide, γ-chlordane, α-chlordane,endosulfan, 1,4,4′-DDE, dieldrine,endrine, 4,4′-DDD, endosulfan,2,4,4′DDT, endrin)	EN 15662
"A BIO TECH LAB" ltd. Sremska Kamenica	Determining concentrations of organochlorine pesticides	U 12 03; U12 06 (ref. document)
Jugoinspekt Beograd AD, Topĉider Institute, Laboratory for Food Quality and Safety Analysis	Determining of organochlorine pesticides	JUP 010102-34

List of accredited organisations for analysis of POPs in animal feed

Accredited organisation	Types of analysis	Method
SP Laboratory AD, Beĉej	Determining residues of organochlorine pesticides	SRPS EN 15741:2010; SRPS EN 15742:2010

Institute of Meat Hygiene and Technology, Laboratory Sector	Determining concentrations of organochlorine pesticides and PCB	02R.01.001 (ref. document)
Jugoinspekt Beograd AD, Topčider Institute, Laboratory for Food Quality and Safety Analysis	Determining of organochlorine pesticides	JUP 010102-34 (ref. document)
Centre for food testing .	Determining of organochlorine pesticides	AOAC 970.52, 983.21, 984.21, 985.22
"A BIO TECH LAB" ltd. Sremska Kamenica	Determining concentrations of organochlorine pesticides	U 12 03; U12 06 (ref.document)

List of accredited organisations for analysis of POPs in waste

Accredited organisation	Types of analysis	Method
Institute of Public Health, Belgrade	Determining of PCB	SRPS EN 15308:20100107
	Determining of PCDD and PCDF	EPA M 8290A
	Determining of PAH	EN 15527:2007
	Determining of pesticides (α-BHC, lindan, β-BHC, δ-BHC, heptachlor, heptachlor epoxide, α-endosulfan, β-endosulfan, aldrine, dieldrine, endrine, *p,p*-DDE, *p,p*-DDD, *p,p*-DDT)	EPA M 8270D
Occupational Health and Safety Institute, Novi Sad	Waste characterization –Determination of PCB	EN 15308: 2008
	Waste characterization –Determination of PAH	BS EN 15527:2008
"Mol AD", company for chemistry, biotechnology and consulting	Determining concentrations of PCB	EPA M 8082 A: 1996
	Determining concentrations of organochlorine pesticides (lindan, aldrine, dieldrine, endrine, heptachlor, *p,p'*-DDT)	EPA M 8081 B: 1998
	Determining concentrations of PAH	EPA M 550.1:1990
Anahem d.o.o Laboratory, Belgrade	Waste characterization – determining concentrations of semi volatile organic substances (PAH, pesticides and PCB)	EPA 3540/8270: 1998
	Determining concentrations of PCB (PCB-28, PCB-52, PCB-101, PCB-118, PCB-138, PCB-153, PCB–180, PCB–328)	EN 15308:2008
Institute "Vtrogas" d.o.o Laobratory Novi Sad	Determination of PCB	EN 15308: 2005
	Determination of PAH	EPA M 8270
Holding Company Occupational Health and Safety and Environmental Protection, Belgrade, Laboratory for environmental protection	Determination of PCB	EPA 8270 C EPA 3350 C
	Determining concentrations of PAH	EPA 8270 C EPA 3350 C
	Determining concentrations of organochlorine pesticides	EPA 8270 C EPA 3350C

Existing capacity for sample treatment and POPs analysis in your country **YES**

if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)

Please see answers above	**Please see answers above**	**All above mentioned laboratories for POPs analysis are accredited**
Faculty of Chemistry, University of Belgrade	**organochlorine pesticides-OCP** **PCBs** **perfluorinated POPs**	**Instruments: GCMS-QP2010 Ultra (Shimadzu, Kyoto, Japan) comprehensive two dimensional gas chromatograph-quadrupole mass spectrometer (GC_GC-MS) with ZX2 thermal modulation system (Zoex Corp.).** **Waters, UPLC Acquity H class, TQ detector**
Requirements for capacity-building on POPs monitoring in your country ? **YES (**indicate what capacity strengthening would be necessary)		
if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	needs for capacity building are in the filed of POPs analyzing and monitoring in biological human samples.	
Does your country have the capacity to provide capacity building to other countries? **NO**		
if YES, please indicate what capacity-building your country could provide (add rows as necessary)		
Does the country have a NIP that covers also POPs monitoring? **YES**		
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)		

ACTION PLAN FOR MONITORING AND RESEARCH OF POPs CHEMICALS

	GENERAL GOAL: Provided information for decision makers, public and international organisations about presence of POPs chemical in the environment through adequate monitoring and organised system of collecting information and reporting.
	SPECIFIC GOAL: Improved existing legal framework for the measurement of POPs chemicals in environmental matrices and food.

	Action	Key player	Deadline
8.1.	Continue the process of accepting statutory and recommended EU standards for the measurement of POPs chemicals, especially new ones, in environmental media and food, as SRPS standards.	Institute for Standardisation; responsible ministries	2016-2020.
8.2.	Continue the establishment of annual program of the post-registration control of plant protection products.	Ministry responsible for agriculture	2016-2020.
8.3.	Create a monitoring concept for new POPs chemicals in the environment and its integration in the established program for measuring levels of POPs in the environment.	Ministry responsible for environmental protection; Serbian Environmental Protection Agency; Scientific Research Organisations	2016-2018.
	SPECIFIC GOAL: Conducted systematic monitoring of POPs chemicals in environmental media and food.		
8.4.	Strengthening administrative and expert capacities for implementing program of monitoring POPs in the environment and human and animal food, taking in account gender equality.	Ministry responsible for environmental protection; Serbian Environmental Protection Agency; Ministry responsible for agriculture(Veterinary Directorate, Plant Protection Directorate, relevant inspection bodies); Ministry responsible for health	2016-2017.

8.5.	Continue with monitoring based on the implemented programs for measuring levels of POPs in the environment and food and transparent reporting of the results.	Serbian Environmental Protection Agency; Republic Hydro meteorological service of Serbia; state and provincial regulatory institutions and local self-governments; accredited and/or authorised laboratories; Scientific Research Organisations	2016 -2020.
8.6.	Improve the work of professional organisations (laboratories) for measuring POPs chemicals, especially the new ones, through accreditation of methods, procurement of laboratory equipment and training of laboratory employees.	Serbian Environmental Protection Agency; Republic Hydro meteorological service of Serbia; Accreditation Board of Serbia; accredited and/or authorised laboratories; Ministry responsible for science; Scientific Research Organisations	2016-2020.
8.7.	Sensitisation of employees in professional organisations and relevant institutions for developing systems of gender sensitive indicators and databases.	Serbian Environmental Protection Agency; Republic Hydro meteorological service of Serbia; Accreditation Board of Serbia; accredited and/or authorised laboratories; Scientific Research Organisations	2016 – 2018.
	SPECIFIC GOAL: Improved national capacities for scientific and research development in the field of POPs chemicals.		
8.8.	Create and regularly update national database of	Ministry responsible for	2016-2017.

	scientific and educational institutions, as well as projects dealing with POPs chemicals that will be made publicly available.	science; Ministry responsible for environmental protection; Ministry responsible for agriculture	
8.9.	Development and implementation of project for measuring POPs and their metabolites in environmental media, food, biological material, products and waste.	Ministry responsible for science; Ministry responsible for health; Ministry responsible for agriculture; Scientific Research Organisations; Civil Society Organisations	2016-2020.
8.10	Development and implementation of projects for (1) the study of physical, chemical, physic-chemical and biochemical phenomena, (2) the assessment of the risks for human health and environment, (3) the study of interaction with other pollutants, (4) development of new methods and technologies for removal of POPs chemicals from environmental media and similar projects.	Ministry responsible for science; Ministry responsible for health; Ministry responsible for agriculture; Ministry responsible for environmental protection; Scientific Research Organisations; Civil Society Organisations	2016-2020.

Does the country carry out research that generates data on POPs? **YES**

if yes, please provide references/citations or links to reports, reviews or publications containing further details

Selection of papers covering various aspects of POPs published in international and national scientific journals

Author	Title of the paper	Journal

Vojinović Miloradov. M., *et al.*	Impact of wastewater discharges to Danube surface water pollution by emerging and priority pollutants in the vicinity of Novi Sad, Serbia.	Fresenius Environmental Bulletin, 2014; ISSN: 1018-4619, Volume 23, No. 9: 2137-2145.
Grujić Letić, N *et al.*	Determination of Emerging Substances in the Danube and Potential Risk Evaluation. CLEAN – Soil, Air, Water,	ISSN: 1863-0669, DOI: 10.1002/clen.201400402.
Miloradov, M.B.	Industrial emerging chemicals in the environment	Hem Ind, 2014; Vol.68 (1): 51–62.
Ćurčić, M. *et al.*	Cadmium and decabrominated diphenyl ether mixture: *In vitro* evaluation of cytotoxic, prooxidative and genotoxic effects	Environ Toxicol Pharm, 2014; Vol. 38(2): 663-671.
Ćurčić, M. *et al.*	Relationship of hepatotoxicity and target tissue dose of decabrominated diphenyl ether in subacutely exposed wistar rats	Vojnosanitetski pregled, 2014; ID 5479, *accepted manuscript, in press.*
Fa, S. *et al.*	Hexabromocyclododecane facilitates FSH activation of ERK1/2 and AKT through epidermal growth factor receptor in rat granulosa cells	Arch Toxicol, 2014;Vol.88 (2): 345-354.
Milić, N. *et al.*	Screening analyses of wastewater and Danube surface water in Novi Sad locality, Serbia	Fresenius Environ Bull, 2014; Vol.23(2): 372-377.
Pergal, M. *et al.*	Leaching of polycyclic aromatic hydrocarbons from power plant lignite ash-influence of parameters important for environmental pollution	Environ Sci Pollut Res, 2014; Vol.21(5): 3435-3442.
Vukovic, G. *et al.*	Air quality in urban parking garages (PM10, major and trace elements, PAHs): Instrumental measurements vs. active moss biomonitoring	Atmos Environ, 2014; Vol.85: 31-40.
Stojic, N. *et al.*	Transformers as a potential for soil contamination	Metalurgija, 2014; Vol.53(4):689-692.
Vukavić, T., *et al.*	Human milk POPs and neonatal risk trend from 1982 to 2009 in the same geographic region in Serbia.	Environment International, Volume 54: 45-49.

Stankovic, D. *et al.*	Concentration of PAHS in forest ecosystems of the protected natural resource "Avala"	Fresenius Environ Bull, 2013; Vol.22(1):136-141.	
Beskoski, V. *et al.*	Perfluorinated compounds in sediment samples from the wastewater canal of Pancevo (Serbia) industrial area	Chemosphere, 2013;Vol.91(10):1408-1415.	
Savic, R. *et al.*	Hazardous and harmful substances in sediments of the Jegricka stream	J Food Agric Environ, 2013; Vol. 11(1):1152-1156.	
Stanojlovic, O. *et al.*	Ontogenetic influence on rat susceptibility to lindane seizure after pretreatment with phencyclidine	Environ Toxicol Pharmacol, 2013; Vol.35 (2): 161-170.	
Turk-Sekulic, M. *et al.*	Assessment of atmospheric distribution of polycyclic aromatic hydrocarbons using a molecular structure model	Atmos Res, 2013; Vol.128:111-119.	
Trickovic, JS. *et al.*	Lindane sorption and desorption behaviour on sediment organic matter	J Serb Chem Soc, 2013; Vol.78(6): 883-895.	
Djinovic-Stojanovic, J. *et al*.	Emission of Polycyclic Aromatic Hydrocarbons from Beech Wood Combustion	Energy Sources Part A-Recovery Util Environ Eff, 2013; Vol.35(4): 328-336.	
Vukavic, T. *et al.*	Human milk POPs and neonatal risk trend from 1982 to 2009 in the same geographic region in Serbia	Environ Internat, 2013, Vol.54:45-49.	
Jovčić, S. *et al.*	Identification of emission sources of particle-bound polycyclic aromatic hydrocarbons in the vicinity of the industrial zone of the city of Novi Sad	Hem Ind, 2013; Vol.67(2): 337-348.	
Fa, S. *et al.*	Acute effects of hexabromocyclododecane on Leydig cell cyclic nucleotide signaling and steroidogenesis in vitro	Toxicol. Lett., 2013; Vol. 218: 81-99.	
Buha, A. *et al.*	The impact of prolonged cadmium exposure and co-exposure with polychlorinated biphenyls on thyroid function in rats	Toxicol Lett, 2013: Vol.221(2); 83-90.	
Antonijević, B. *et al.*	Mechanisms of toxic effects of interacition of polychlorinated biphenyls and polybrominated diphenylethers	Veterinary Journal, 2012; Vol.66 (3-4): 259-271.	
Ćurčić, M. et *al.*	Combined effects of cadmium and decabrominated diphenyl ether on thyroid hormones in rats.	Arch Ind Hyg Toxicol, 2012; Vol.63(3):255-262.	
Turk-Sekulić, M. *et al.*	Assesment of atmospheric distribution of polychlorinated biphenyls and polycyclic aromatic hydrocarbons using polparameter model	Hem. Ind, 2011; Vol.65(3): 371-380.	

Antonijević, B. *et al.*	Risk characterization for mercury, dichlorodiphenyltrichloroethane and polychlorinated biphenyls associated with fish consumption in Serbia.	Food Chem Toxicol, 2011; Vol. 49(10):2586-2593.
Kaisarević, S. *et al.*	Characterization of dioxin-like contamination in soil and sediments from the "hot spot" area of petrochemical plant in Pancevo (Serbia)	Environ Sci Pollut Res, 2011; Vol.18(4):677-686.
Radonić, J. *et al.*	The octanol-air partition coefficient, K-OA as a predictor of gas-particle partitioning of polycyclic aromatic hydrocarbons and polychlorinated biphenyls at industrial and urban sites	J Serb Chem Soc, 2011; Vol.76(3): 447-458.
Planojevic, I. *et al.*	Wastewater canal Vojlovica, industrial complex Pancevo, Serbia - preliminary ecotoxicological assessment of contaminated sediment	J Serb Chem Soc, 2011; Vol.76(3):459-478.
Janković, S. *et al.*	Nondioxin-like PCBs in ten different fish species from the Danube river in Serbia.	Environ Monit Assess, 2010; Vol.181(1-4):153-163.
Mladenovic, D. *et al.*	The correlation between lipid peroxidation in different brain regions and the severity of lindane-induced seizures in rats	Mol Cell Biochem, 2010; Vol.333: 243-250.
Cvetkovic, A. *et al.*	Seasonal trends of benzo(a)pyrene in suspended particulate matter in urban areas of Belgrade, Serbia	Chem Ind Chem Eng Q., 2010; Vol.16 (3): 259-268.
Marinovic, D. *et al.*	Purification of waters and elimination of organochloric insecticides by means of active coal	J Serb Chem Soc, 2010;Vol.75(4):575-586.
Ćurčić, M. *et al.*	Toxicological significance and potential risk with polybrominated diphenyl ethers	Arh Farm 2010; 60: 311–322.
Ninkovic, MB. *et al.*	Removal of organochlorine pesticides from water using virgin and regenerated granular activated carbon	J Serb Chem Soc, 2010; Vol.75(4): 565-573.
Kaisarević, S. *et al.*	Effect-directed analysis of contaminated sediment from the wastewater canal in Pancevo industrial area, Serbia	Chemosphere, 2009; Vol.77(7):907-913.
Škrbić, B. *et al.*	Levels of PAHs in soil samples from the vicinity of oil refinery Novi Sad-Serbia	Kuwait J Sci Eng, 2009; Vol.36(11):63-75.
Radonić, J. *et al.*	Gas-particle partitioning of persistent organic pollutants in the Western Balkan countries affected by war conflicts	Environ Sci Pollut Res, 2009; Vol.16(1):65-72.

Škrbić, B. *et al.*	Levels of organochlorine pesticides in crops and related products from Vojvodina, Serbia: Estimated dietary intake	Arch Environ Contam Toxicol, 2008; Vol.54(4):628-636.
Vukavić, T. *et al.*	PCB pollution of early milk in the Province of Vojvodina	Environ Toxicol Phar, 2008, Vol. 25(2):176-178.
Stankovic, D. *et al.*	Effect of traffic on the soil contamination with polycyclic aromatic hydrocarbons (PAHs)	Biotechnol Biotechnol Equip, 2008; Vol.22(2): 736-741.
Škrbić, B. *et al.*	Assessment of the Serbian population exposure to polychlorinated biphenyls by crops	Environ Toxicol Phar, 2008; Vol.25(2): 171-175.
Andrić, N. *et al.*	In vivo and in vitro effects of PCB126 and PCB153 on rat testicular androgenises	Environ Toxicol Phar, 2008; Vol.25(2): 222-226.
Crnkovic, D. *et al.*	Danube and Sava river sediment monitoring in Belgrade and its surroundings	J Environ Sci Health Part A-Toxic/Hazard. Subst. Environ. Eng., 2008;Vol.43(12): 1353-1356.
Škrbić, B. *et al.*	Non-dioxin-like PCB in crops and related products: Levels and intakes in Serbia	Food Addit Contam: Part A, 2007 ,Vol.24(6): 652 – 662.
Turk, M. *et al.*	Post-war levels of persistent organic pollutants (POPs) in air from Serbia determined by active and passive sampling methods	Environ Chem Lett, 2007, Vol. 5(3): 109-113.
Škrbić, B. *et al.*	Organochlorine residues in some Serbian agricultural products	Fresenius Environ. Bull., 2007; Vol.16(2): 122-126.
Kaisarevic, S. *et al.*	Detection of dioxin-like contaminants in soil from the area of oil refineries in Vojvodina region of Serbia.	B Environ Contam Toxic, 2007; Vol.79 (4):422-426.
Škrbić, B. *et al.*	Organochlorine pesticides and polychlorinated biphenyls in surface soils of Novi Sad and bank sediment of the Danube River	J. Environ. Sci. Health Part B-Pestic. Contam. Agric. Wastes, 2007; Vol.42(3): 311-319.
Škrbić, B. *et al.*	Organochlorine and organophosphate pesticide residues in wheat varieties from Serbia	Food Addit Contam: Part A, 2007, Vol.24 (7): 695 – 703.
Škrbić, B. *et al.*	Level of organochlorine pesticides and polychlorinated biphenyls in products of sugar beet refineries in Serbia	Fresenius Environ. Bull., 2007; Vol.16(5): 576-581
Škrbić, B. *et al.*	Principal component analysis for soil contamination with organochlorine compounds	Chemosphere, 2007, Vol. 68(11): 2144-2152.

Škrbić, B. *et al.*	Distribution of chlorinated organic pollutants in a wide variety of soils from Europe and Asia: A multivariate statistical approach	Arch Environ Contam Toxicol, 2007; Vol.52(4): 466-474.
Antonijević, B. *et al.*	Simulated impact of a fish based shift in the population *n*–3 fatty acids intake on exposure to dioxins and dioxin-like compounds	Food Chem Toxicol, 2007, Vol. 45(11): 2279-2286.
Andrić, L.N. *et al.*	Effect of a PCB-based transformer oil on testicular steroidogenesis and xenobiotic-metabolizing enzymes	Reprod Toxicol, 2006; Vol. 22(1): 102-110.
Lemić, J. *et al.*	Removal of atrazine, lindane and diazinone from water by organo-zeolites	Water Res, 2006, Vol.40 (5):1079-1085.
Milosevic-Djordjevic, O. *et al.*	Monitoring of lymphocyte micronuclei among newborns from Kragujevac in Central Serbia before and after environmental contamination	Tohoku J Exp Med, 2005; Vol.205(1):1-9.
Lončar, S. E. *et al.*	Qualitative TLC determination of some polycyclic aromatic hydrocarbons in sugar-beet	J Serb Chem Soc, 2005, Vol.70(10): 1237-1242.
Škrbić, B. *et al.*	Polycyclic Aromatic Hydrocarbons in Surface Soils of Novi Sad and Bank Sediment of the Danube River	Journal of Environmental Science and Health, Part A, 2005 ;Vol. 40(1): 29– 42.
Golobočanin, D.D. *et al.*	Principal component analysis for soil contamination with PAHs	Chemometr Intell Lab, 2004, Vol. 72 (2): 219-223.

Author	Title of the paper	Journal
Ćurčić, M. *et al.*	The effects of Cd and BDE-209 co-exposure on hematological parameters in rats	Toxicol Lett, 2014; 229: S209.
Buha, A. *et al.*	Subacute toxicity of PCBs in rats: Is hepatic oxidative stress induction dose dependent?	Toxicol Lett, 2014; 229: S54.
Milovanović, V. *et al.*	The effects of BDE-209 on peripheral leukocyte counts in subacutely exposed Wistar rats	Toxicol Lett, 2014; 229: S208.
Ćurčić, M. *et al.*	Co-exposure to cadmium and persistent polyhalogenated pollutants – effects on thyroid function in rats	11th Serbian Congress of Toxicology – interna congress, 2014, Sremski Karlovci, June 24-27, Abstract book: 166.
Buha, A. *et al.*	BMD approach as alternative to traditionally used NOAEL in assessing the hepatotoxicity risk from PCBs	11th Serbian Congress of Toxicology – interna congress, 2014, Sremski Karlovci, June 24-27, Abstract book: 155.
Janković, S. *et al.*	Dietary exposure to toxic substances (Cd, Hg, Pb, DDT, ndl-PCB and PBDE) in adult population in Serbia	11th Serbian Congress of Toxicology – interna congress, 2014, Sremski Karlovci, June 24-27, Abstract book: 145-146.

Milovanović, V. *et al.*	Oxidative stress in liver induced by decabrominated dipheyl ether in subacutely exposed Wistar rats	11th Serbian Congress of Toxicology – international congress, 2014, Sremski Karlovci, June 24-27, 2014, Abstract book: 41.
Beškoski, V. *et al.*	Pollution without bounaries: River Danube, Serbia,Europe	22nd Symposium on Environmental chemistry, 2013, Tokyo, July 31-Avg 2, Abstract book:238.
Nenin, T. *et al.*	PAH and PCB extraction efficiency from soil by ASE method („Accelerated Solvent Extraction“)	6th Symposium, Chemistry and Environmental Protection, 2013, Vrsac, May 21-24, 2013. Book of abstract: 400.
Antonijević, E. *et al.*	Risk assessment of PBDE intake via fish using @risk software.	6th Symposium, Chemistry and Environmental Protection, 2013, Vrsac, May 21-24, 2013. Book of abstract: 368.
Radonić, J. *et al.*	Seasonal variations of HCB concentration levels in the ambient air of Fruška gora mountain	6th Symposium, Chemistry and Environmental Protection, 2013, Vrsac, May 21-24, 2013. Book of abstract: 326.
Turk Sekulič, M. *et al.*	DDT, DDD and DDE residues in human milk and umbilical cord blood in Vojvodina region	6th Symposium, Chemistry and Environmental Protection, 2013, Vrsac, May 21-24, 2013. Book of abstract: 300.
Štrbac, S. *et al.*	Persistent organic pollutants in river Tisza sediments, Serbia	6th Symposium, Chemistry and Environmental Protection, 2013, Vrsac, May 21-24, 2013. Book of abstract: 230.
Antić, N. *et al.*	Determination of pharmaceuticals and pesticides in urban wastewater	6th Symposium, Chemistry and Environmental Protection, 2013, Vrsac, May 21-24, 2013. Book of abstract: 64.
Laušević, M.	Pharmaceuticals and pesticides in sediments, surface and groundwater of Danube river basin in Serbia	6th Symposium, Chemistry and Environmental Protection, 2013, Vrsac, May 21-24, 2013. Book of abstract: 56.
Ćurčić, M. *et al.*	Morphological and histological changes in kidneys induced by BDE209 and Cd	Toxicol Lett, 2012; 211: S158.
Milenkovic, SN. *et al.*	Raspberry Leaf and Bud Mite (Phyllocoptes gracilis) in Serbia: the Pest Status and Control Options	International Rubus and Ribes Symposium, Acta Hortic., 2012:253-256.
Ćurčić, M. *et al.*	Effects of BDE209 and Cd mixture on liver in sub-acutely exposed rats	Toxicol Lett, 2012; 205: S211.
Ćurčić, M. *et al.*	Serum liver enzyme levels in Wistar rats 28 days orally exposed to the mixture of BDE209 and cadmium	Toxicol Lett, 2011; 205: S210-S211.
Radosevic, B. *et al.*	Estimation of indicator PCBs intake by freshwater fish consumption.	Toxicol Lett, 2010; 196 (Supplement 1): S337.
Lazic, S. D. *et al.*	Pesticide Residues in Vegetable Samples from the Market of the Republic of Serbia during 2007.	IV Balkan Symposium on vegetables and potatoes. Acta Hortic, 2009:569-576.

Turk-Sekulic, M. *et al.*	Characterization of gas/particle partitioning of PCBs and PAHs in a pilot area of Kragujevac, Serbia	Environmental, Health And Humanity Issues In The Down Danubian Region: Multidisciplinary Approaches, Singapore, World Scientific, 2008: 284-295.
Pantelić, S. *et al.*	Sediments problems in drainage canal from Danube-Tisa-Danube hydro system	Consoil 2008: Theme F - Sustainable & Risk based Land Management, 2008: 263-269.
Petrovic, V. *et al.*	Average intake of dioxins and polychlorinated biphenyls among adult population in Serbia	7th Xenobiotic Metabolism and Toxicity Workshop of Balkan Countries, Novi Sad, Serbia, 2008 June 3-6, Eur J Drug Metabol Pharmacokinet 2008; 33: 14.
Jankovic, S. *et al.*	Levels of non-dioxin-like PCB in freshwater fish from the Danube	45th Congress of the European Societies of Toxicology – EUROTOX 2008, Rhodes, Greece, 2008, October 5-8, Toxicol Lett, 2008; 180: S181.
Antonijevic, B.	Food Chemical Contaminants in Serbia	FOODSAFENET Workshop, International Life Science Institute, 12-13 January 2007, Brussel, Belgium, 2007.
Antonijevic, B.	Exposure of General Population to Dioxines and Dioxin-like Compounds	4th Congress of Serbian Pharmacy with international November 28- December 2,
Zoric S., *et al.*	Danube-Subic sediments: PCB congener profile and dioxin-like toxic potency.	International Symposium on Danube Basin and Sustainable Development, Novi Sad, Serbia and Montenegro (2005), CD Proceedings
Adamov, J. *et al.*	Contents of polychlorinated biphenils in adipose tissue of the human population of Vojvodina (Serbia),	ICOSECS - 4thInternational Conference of the Chemical Societies of the South-East European Countries on Chemical Sciences in Changing Times: Visions, Challenges and Solutions, Belgrade, Serbia and Montenegro (2004), Proceedings 161
Vukomanović, P. *et al.*	Organochlorine and organophosphorus pesticides in various herbal teas grown in our rural environment	Second International Conference on Rural Health & First International Conference on Occupational and Environmental Health in Mediterranean, South East, and Central European Countries 2004, May 26-29 2004, Belgrade, Serbia and Montenegro, Book of abstracts: 116.
Kovacević R., *et al.*	Application of combined bioanalysis and gas chromatography methods in detection of PCB and dioxin-like compounds in sediment samples.	35th IAD Conference, Novi Sad, Serbia and Montenegro (2004), Limnological reports 35, Proceedings: 181-186.

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SLOVAKIA

Country : SLOVAKIA		
Contact information (contact person name + e-mail/telephone): Ing. Daniela Čertíková, phone: +421 2 5956 2512, daniela.certikova@enviro.gov.sk		
Existing capacity for POPs ambient air sampling in your country (indicate if high-volume and/or passive) **YES**		
if yes, please indicate if active (*high-volume or another sampler and/or passive (add rows if necessary)*	High-volume sampler	number of sampling sites: 5
Existing capacity for POPs sampling/analysis in other media (list which media below) **YES**		
HUMAN Matrices **YES**	Human Blood **YES**	WATER **YES**
other media - soil, sediment, food… - please list and provide references to reports/ or indicate organizations carrying the work (Please add rows as necessary): **YES** - in soil, sediment, food, feed		
Water Research Institute (Slovak National Water Reference Laboratory - NRL) provide monitoring activities according to the official document "Frame monitoring programme of Slovak waters for the period 2016-2021" which has been prepared in line with requirements of Directive 2000/60/EC and its daughter Directives for surface and ground water. POPs are included in the monitoring programme. Analyses of POPs are performing centrally by NRL. Besides water POPs are analysed in biota as well. In the past some of POPs have been investigated in water and sediments. Data are available in central national chemical database at Slovak Hydro-meteorological Institute in Bratislava where are located also data from NRL. The last assessment is prepared currently based on the period 2013-2018 for matrix water (493 sampling sites) and for biota (fish) for 251 sampling sites. **UKSUP** (Central Controlling and Testing Institute in Agriculture) participated in soil monitoring program for OCP, PAH and PCB congeners until the program was canceled in the end of 2017 UKSUP established method for analysis of OCPs and PCB congeners in feed and soil, however they did not analyze any sample almost 2 years, because of malfunction of extraction equipment and insufficient sensitivity of analyzator.		
Existing capacity for sample treatment and POPs analysis in your country **YES**		
if yes, please indicated how many laboratories and their location/name (add rows if necessary)	which POPs (organochlorine pesticides-OCP, PCB, dioxins/furans, brominated POPs, perfluorinated POPs)	Is system for data quality management, QA/QC in place? (indicate the most relevant: availability of standard operating procedures for sampling and analyses, participation in national or international interlaboratory tests (PT), accreditation)

Department of Toxic Organic Pollutants, NRL for Halogenated POPs in feed and food, Slovak Medical University, Bratislava, Slovakia	OCPs, PCBs, PCDDs/Fs, PBDEs, PBBs	Standard operating procedures, participation in international laboratory tests (PT), accreditation (EN ISO/IEC 17025:2017)
Slovak National Water Reference Laboratory at Water Research Institute Bratislava, Slovakia	OCP, PCB, PBDE, brominated POPs, (congeners are monitored according to the Directive 2013/39/EU).	Accredited laboratory according to the EN ISO/IEC 17025, Standard operation procedures, Participation in international proficiency testing schemes
National reference centre for pesticides residues, Public Health Authority of the Slovak Republic (ÚVZ SR), Bratislava, Slovakia Specialized laboratories of materialization of living conditions factors, Public Health Authority of the Slovak Republic, Bratislava, Slovakia	Pesticides (200) in baby food (infant formulae, follow-on formulae, baby foods other than processed, processed cereal-based foods for infants and young) and organochlorine pesticides-OCP in w ater. Non dioxin PCB (NDL-PCBs), Congeners PCB 28, PCB 52, PCB 101, PCB 118, PCB 138, PCB 153, PCB 180 in food (meat, meat products, milk, milk products, baby food for infants and young children) and in water. PAHs (benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, indeno(1,2,3-CD)pyrene in water and PAHs (benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene) in baby food for infants and young children.	ÚVZ SR has quality management, QA/QC in place, standard operating procedures, participation in home and international laboratory tests (PT), accreditation (EN ISO/IEC 17025:2017).
UKSUP are not able at present, because of malfunction of extraction equipment and insufficient sensitivity of analyzator.	*UKSUP established OCPs, PAHs and PCB congeners, but are not able at present, because of malfunction of extraction equipment and insufficient sensitivity of analyzator.*	*UKSUP has data quality management, QA/QC in place, but did not participated on PT of POPs and are not yet acredited in POPs residue analysis*
Requirements for capacity-building on POPs monitoring in your country? **YES** (indicate what capacity strengthening would be necessary)		

if yes, please indicate what capacity-building need/priority in relation to POPs monitoring exists for your country (add rows if necessary)	There is need of building capacity in existing laboratories. Because of saving strategies of scientific institutions, universities, and governmental institutions in Slovakia there is lack of researchers and analytical devices.
	At Slovak National Water Reference Laboratory the required analytical instrumentation is available, however some of methods are at present time under development for matrix water and aquatic organisms such as fish, molluscs and crustaceans. Currently there is a lack of experts - analysts with required experiences.
	UKSUP require more sensitive GC MS/MS analyzer, HPLC/FLD and repair of extraction equipment for established OCPs and PCB congeners analysis.
Does your country have the capacity to provide capacity building to other countries? **YES**	
if YES, please indicate what capacity - building your country could provide (add rows as necessary)	Training course on selected POPs analysis.
Does the country have a NIP that covers also POPs monitoring? **YES**	
If the answer is yes, list the main actions related to the effectiveness evaluation: monitoring activities performed/ongoing, media, sampling sites, which POPs, and time period, responsible institution generating data, contact person and his/her contacts (add rows below as necessary)	
***(VÚVH)* - Water Research Institute** (Slovak National Water Reference Laboratory - NRL) provide monitoring activities according to the official document "Frame monitoring programme of Slovak waters for the period 2016-2021" which has been prepared in line with requirements of Directive 2000/60/EC and its daughter Directives for surface and ground water. POPs are included in the monitoring programme. Analyses of POPs are performing by NRL centrally. Sampling is provided based on combination with the laboratories of Slovak Water Management Enterprise. Besides water matrix they are analysed in biota as well. In the past, some of POPs have been investigated in water and in sediments. Data are available in central national chemical database at Slovak Hydro-meteorological Institute in Bratislava where are located also data from NRL. The last assessment is prepared currently based on period 2013-2018 for matrix water (493 sampling sites) and for biota (fish) for 251 sampling sites. Contact person: Jarmila Makovinská, WRI, Nábr. arm. gen. L. Svobodu 5, 812 49 Bratislava, Slovak Republic jarmila.makovinska@vuvh.sk	
Monitoring: ***(ÚVZ SR)* - Public Health Authority of the Slovak Republic** (National reference centre for pesticides residues) provide monitoring activities according to the official document COMMISSION IMPLEMENTING REGULATION (EU) 2019/533 of 28 March 2019 concerning a coordinated multiannual control programme of the Union for 2020, 2021 and 2022 to ensure compliance with maximum residue levels of pesticides and to assess the consumer exposure to pesticide residues in and on food of plant and animal origin. Samples of food products falling under Reg. (EU) No 609/2013 and for which MRLs are established in Directives 2006/125/EC and 2006/141/EC. Public Health Authority of the Slovak Republic (Specialized laboratories of materialization of living conditions factors) determines four PAHs (benzo(a)pyrene, benzo(a)anthracene, benzo(b)fluoranthene, chrysene) and PCB	

(Congeners PCB 28, PCB 52, PCB 101, PCB 118, PCB 138, PCB 153, PCB 180) in baby food for infants and young children during official food control according to the European Union (EU) legislation.

Contact person: Zuzana Sirotná, ÚVZ SR, Trnavská cesta 52, 826 45 Bratislava, Slovak Republic
zuzana.sirotna@uvzsr.sk

Does the country carry out research that generates data on POPs? **YES**

if yes, please provide references/citations or links to reports, reviews or publications containing further details

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UKRAINE

Country: Ukraine

The National Academy of Agrarian Sciences of Ukraine

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Contact information (contact person + email / phone): Moklyachuk Lidia Ivanivna, e-mail: moklyachuk@ukr.net, +38 095 354 61 11		
The current capacity for air sampling for POPs in your country (specify if high and / or passive) YES / NO (please choose one)		
If yes, please specify the level (if necessary, add the line)	**NO**	seats sampling
Existing capacity for the sampling / analysis for POPs in other components (specify below where components) YES / NO (please choose one)		
The human body **NO**	Human blood **NO**	Water bodies and water **YES**
other components - soil, sludge, food etc - please specify and provide references to reports / or provide organizations with relevant research (if necessary, add the line) **Soil YES** **Plants YES**		
Existing opportunities for sampling and analysis of POPs in your country YES / NO (please choose one)		
If yes, please indicate how many laboratories and their location / name (add rows if necessary)	Are POPs (organochlorine pesticides, PCBs, dioxins / furans, brominated POPs, perfluorinated POPs) may determine the laboratory	or a system of quality control data, QA / QC? (Specify the most relevant: the availability of standard operating procedures for sampling and testing, participation in national and international interlaboratory tests (PT), accreditation)
YES Department ekotoksykolohiyi IAP NAAS	DDT, hexachlorobenzene	**NO**
The main problems are: outdated equipment; lack of modern equipment and means for determining POPs; Previous methods of extracting POPs with matrix methods require large amounts of reagents, including those belonging to the precursors.		
The requirements for capacity building on monitoring POPs in your country? YES / NO (please choose one) indicate that capacity building will need to		
If yes, please indicate whether there is a need for capacity-building / monitoring POPs priorities for your country (add rows if necessary)	**YES** **Creating a number of laboratories for the determination of POPs is a priority for Ukraine, because the problem of environmental pollution POPs are not yet solved.** **In order to extend the range of analytical determination POPs by compounds that have a large number of isomers, PCBs, etc., to create laboratories equipped with modern equipment and reagents.**	
Does your country's ability to assist in the creation (development) capacity to other countries? YES / NO - select one answer		
If "yes", please specify which capacity building opportunities can provide your country (add rows if necessary)	**NO**	

Does the country have a national implementation plan, which involves monitoring of POPs? YES / NO - select one answer
If the answer is "Yes", list the main actions related to the assessment of effectiveness, monitoring measures execu / current, media, sampling sites that pops time and responsible institutions that generate data, contact person and his / its contacts (add lines below) if necessary)
Whether conducting country research, collected data on POPs? YES / NO - select one answer
if yes, please provide a link to reports, reviews or publications that contain additional details
YES **Link:** **1. Moklyachuk at al. Sustainable strategies of phytoremediation of the sites polluted with obsolete pesticides. Application of phytotechnologies for cleanup of industrial, agricultural, and wastewater contamination. Environmental and Food Safety and Security for South-East Europe. NATO Science for Peace and Security. Series C: Environmental Security. [Ed. K. Vitale]. Dordrecht, The Netherlands: Springer, 2012. P. 81-89.** **2. Moklyachuk at al. Phytoremediation of soil polluted with obsolete pesticides. Environmental and food safety and security for Soth-East Europe. NATO Sciences for peace and security. Series-C: Environmental security. [Ed. P. Kulakow]. New York: Springer-Verlag, 2010 p. 116 - 127.** **3. Moklyachuk at al. The ecotoxicological estimation the sites polluted with obsolete pesticides. Proceeding of 9th International HCH and Pesticides Forum. Chisinau, Republic of Moldova, 2007. P. 230-232.**

Annex 2 to the 3rd CEE Regional Monitoring Report (2021)

Additional Data

This annex presents additional data in relation to chapter 5.2. on core media for several chemicals.

a) chlordane in ambient air and overall trends in Figures A1-A4 as follows: trans chlordane, cis- and trans-nonachlor and oxychlordane time series

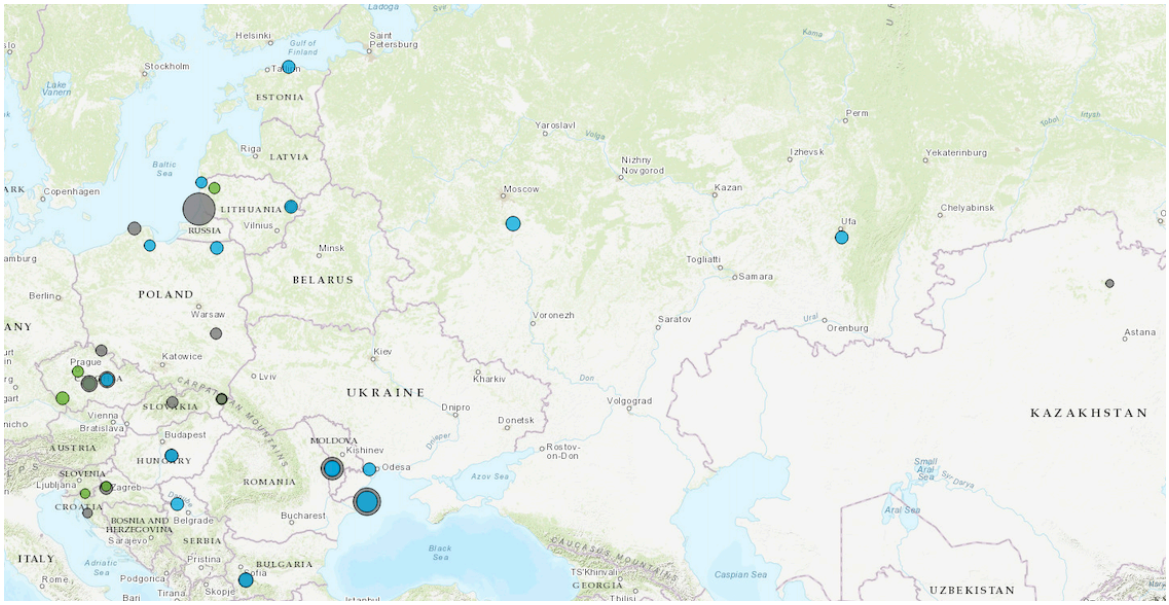


Figure A1 Trends observed in the CEE region for changes in levels of trans-chlordane in ambient air between 2007-2019. Decreasing trend is marked in green, statistically non-significant trend in blue, and no trend/not available trend in grey. Size of the circle represents the median of the concentrations. (source: GMP DWH)

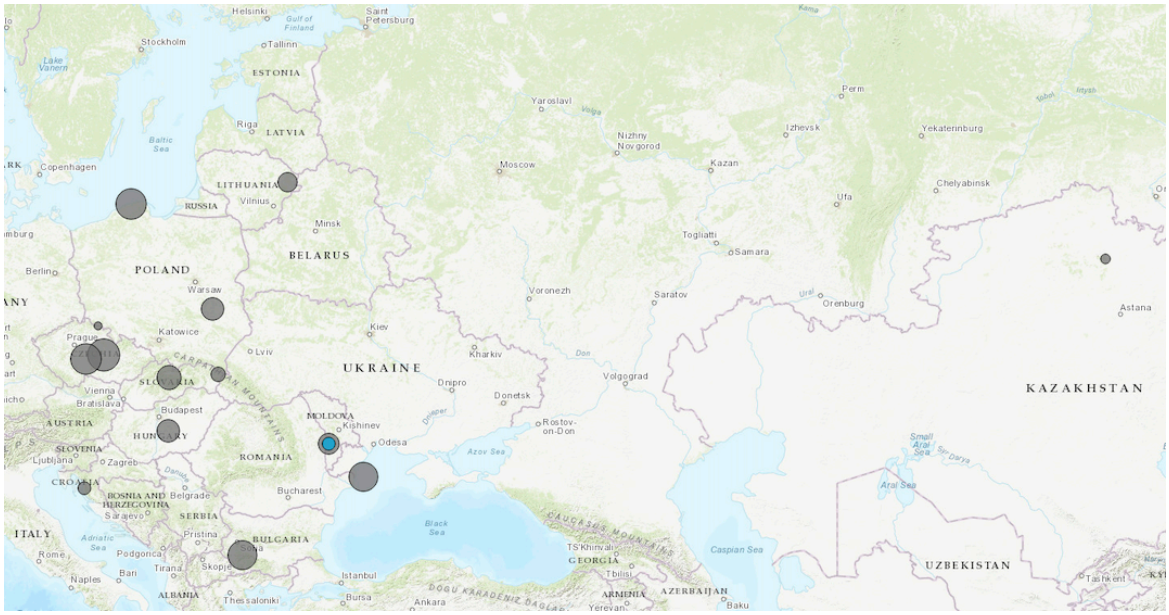


Figure A2 Trends observed in the CEE region for changes in levels of cis-nonachlor in ambient air between 2007-2019. Decreasing trend is marked in green, statistically non-significant trend in blue, and no trend/not available trend in grey. Size of the circle represents the median of the concentrations. (source: GMP DWH)

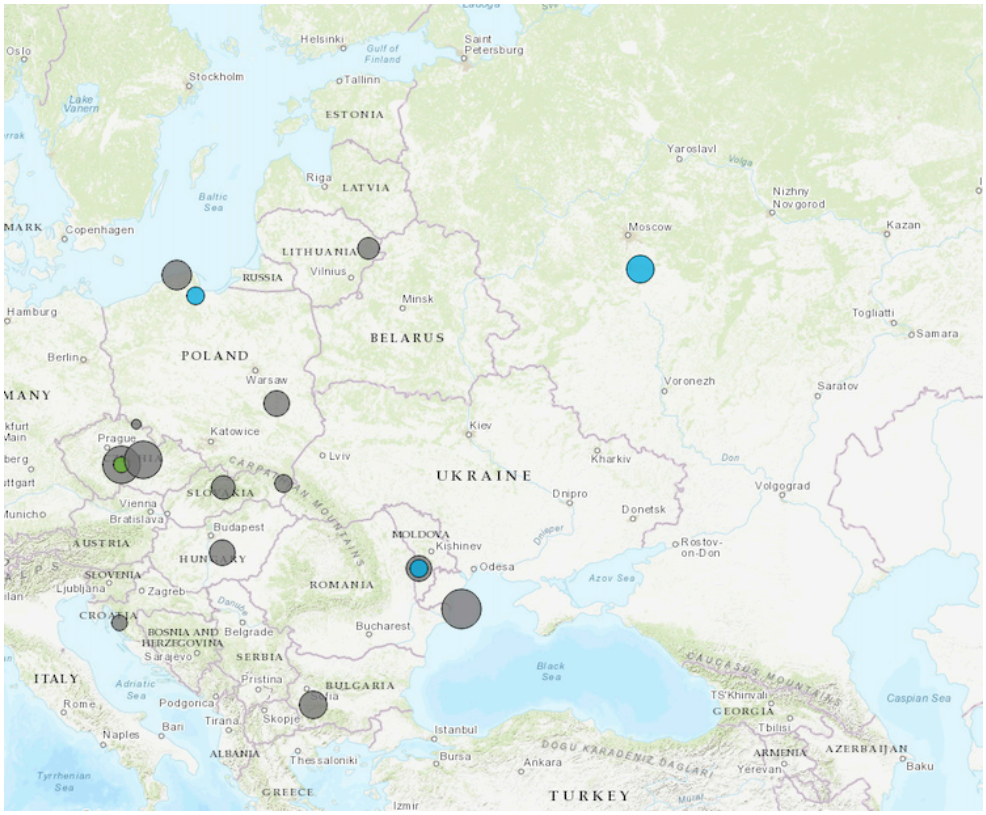


Figure A3 Trends observed in the CEE region for changes in levels of trans-nonachlor in ambient air between 2007-2019. Decreasing trend is marked in green, statistically non-signifcant trend in blue, and no trend/not available trend in grey. Size of the circle represents the median of the concentrations. (source: GMP DWH)

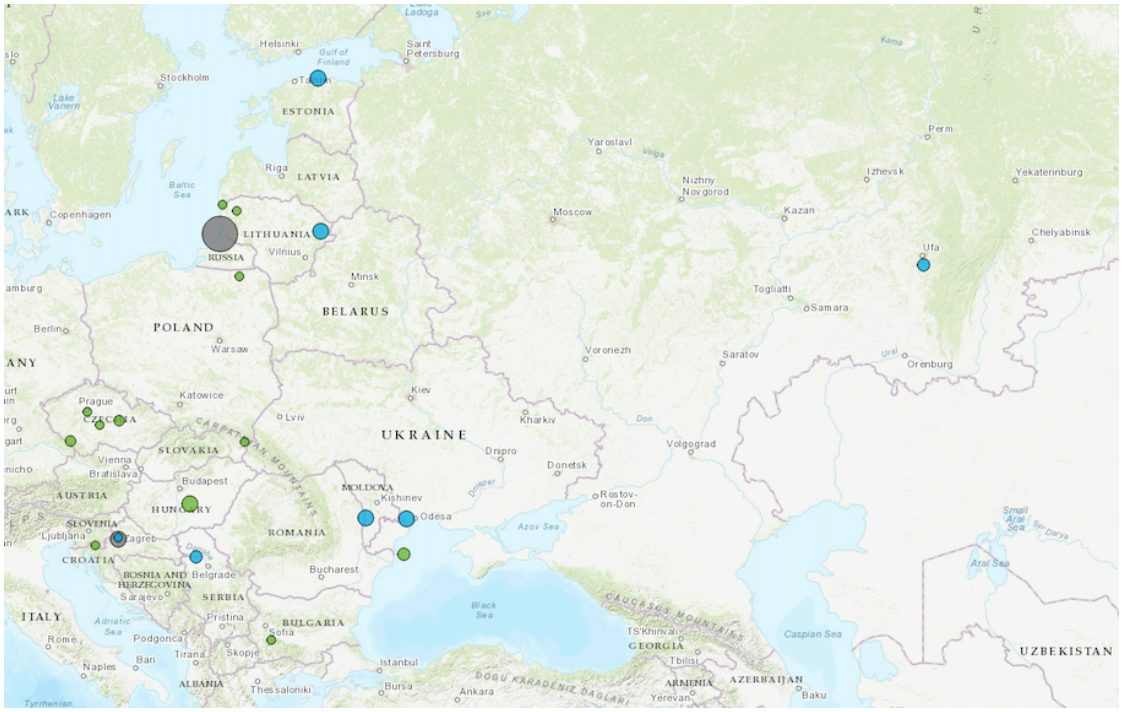


Figure A4 Trends observed in the CEE region for changes in levels of oxychlordane in ambient air between 2007-2019. Decreasing trend is marked in green, statistically non-signifcant trend in blue, and no trend/not available trend in grey. Size of the circle represents the median of the concentrations. (source: GMP DWH)

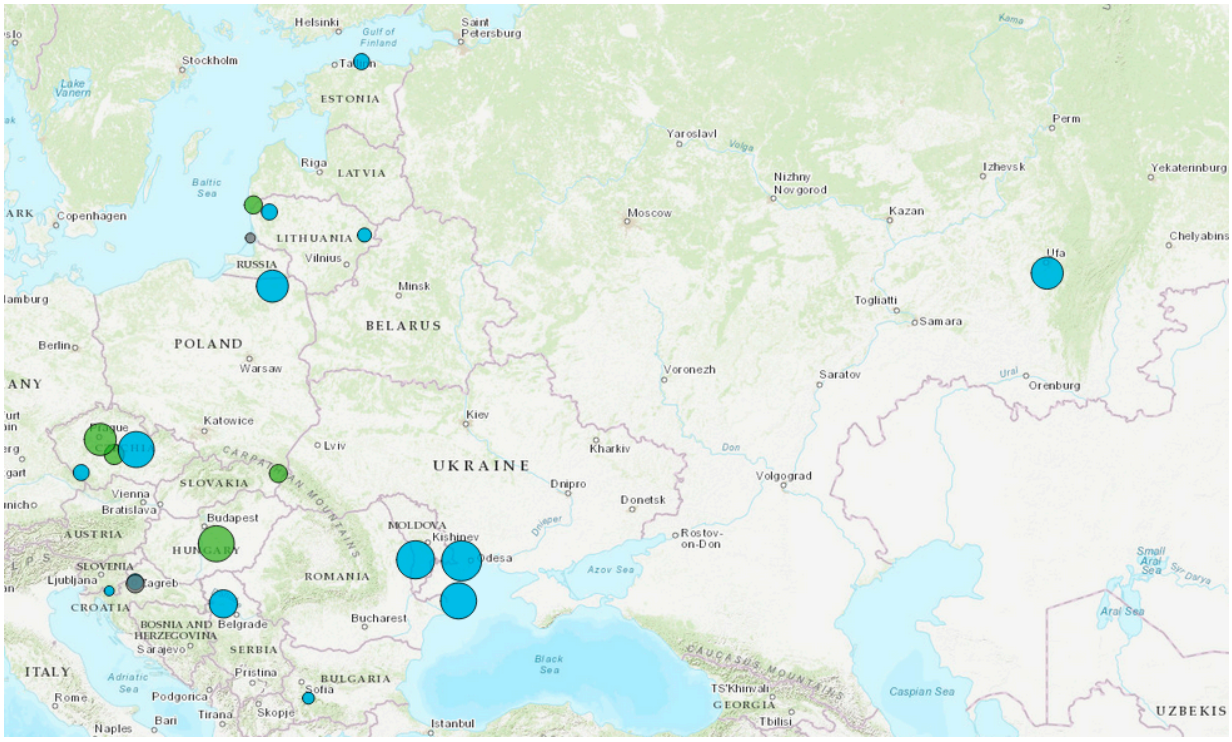


Figure A5 Trends observed in the CEE region for changes in levels of sum 17 PCDDs/Fs in ambient air between 2011-2019. Decreasing trend is marked in green, statistically non-significant trend in blue, and no trend/not available trend in grey. Size of the circle represents the median of the concentrations. (source: GMP DWH)

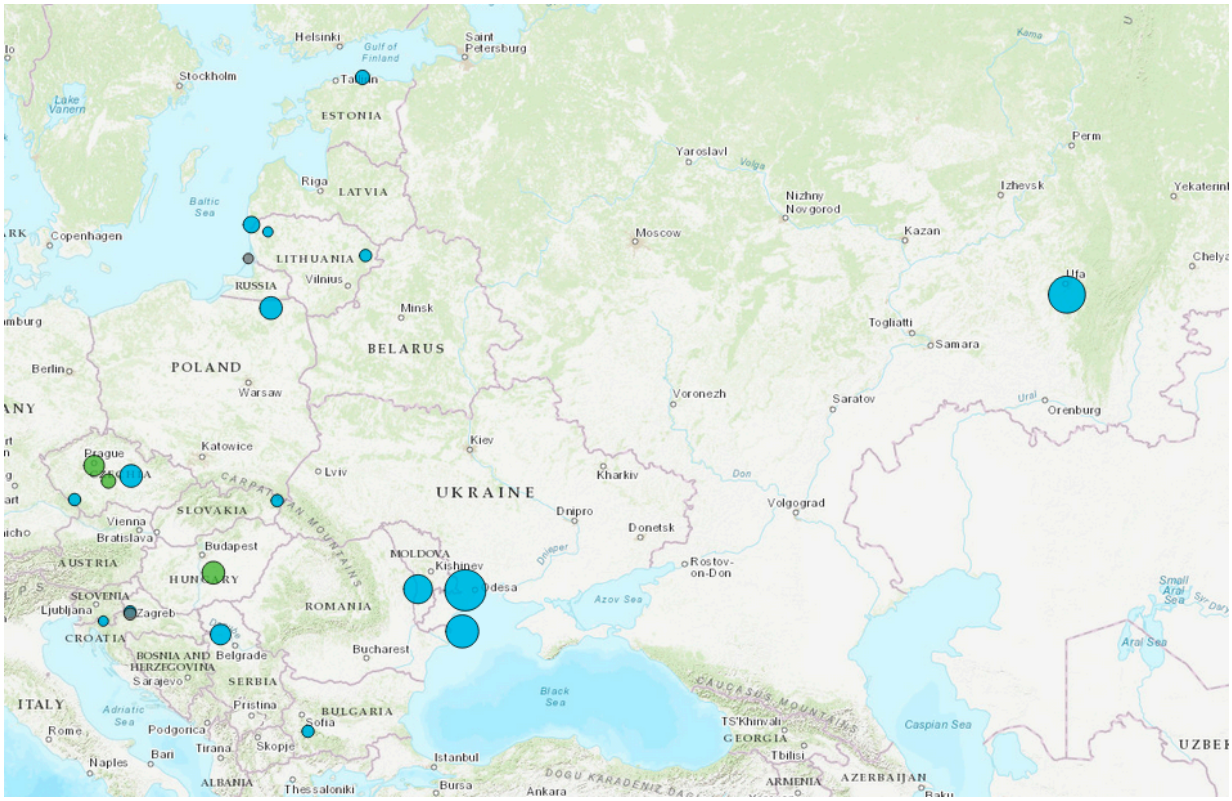


Figure A6 Trends observed in the CEE region for changes in levels of WHO1998 TEQ UB for PCDDs/Fs in ambient air between 2011-2019. Decreasing trend is marked in green, statistically non-significant trend in blue, and no trend/not available trend in grey. Size of the circle represents the median of the concentrations. (source: GMP DWH)

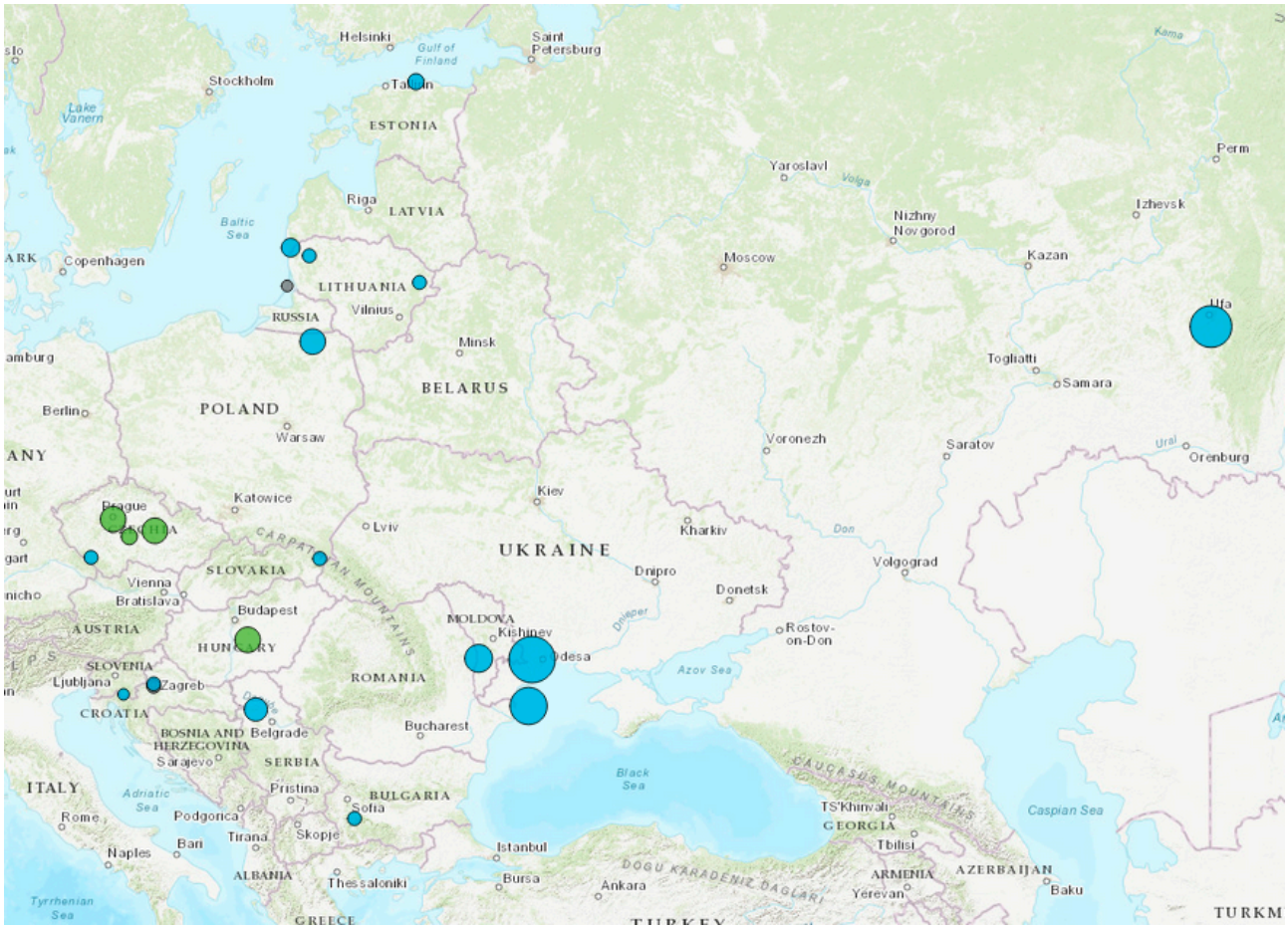


Figure A7 - Trends observed in the CEE region for changes in levels of WHO1998 TEQ LB for PCDDs/Fs in ambient air between 2011-2019. Decreasing trend is marked in green, statistically non-significant trend in blue, and no trend/not available trend in grey. Size of the circle represents the median of the concentrations. (source: GMP DWH)

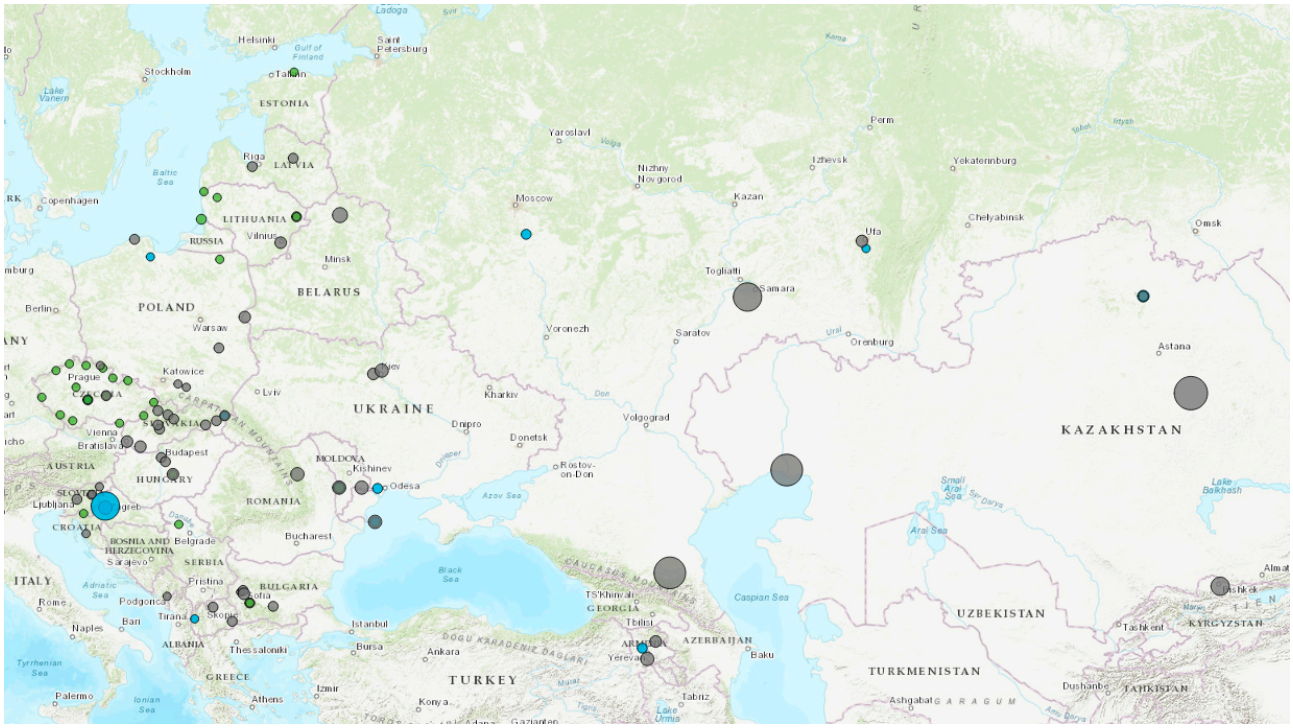


Figure A8 - Trends observed in the CEE region for changes in levels of alpha-HCH in ambient air between 2004-2019. Decreasing trend is marked in green, statistically non-significant trend in blue, and no trend/not available trend in grey. Size of the circle represents the median of the concentrations. (source: GMP DWH)

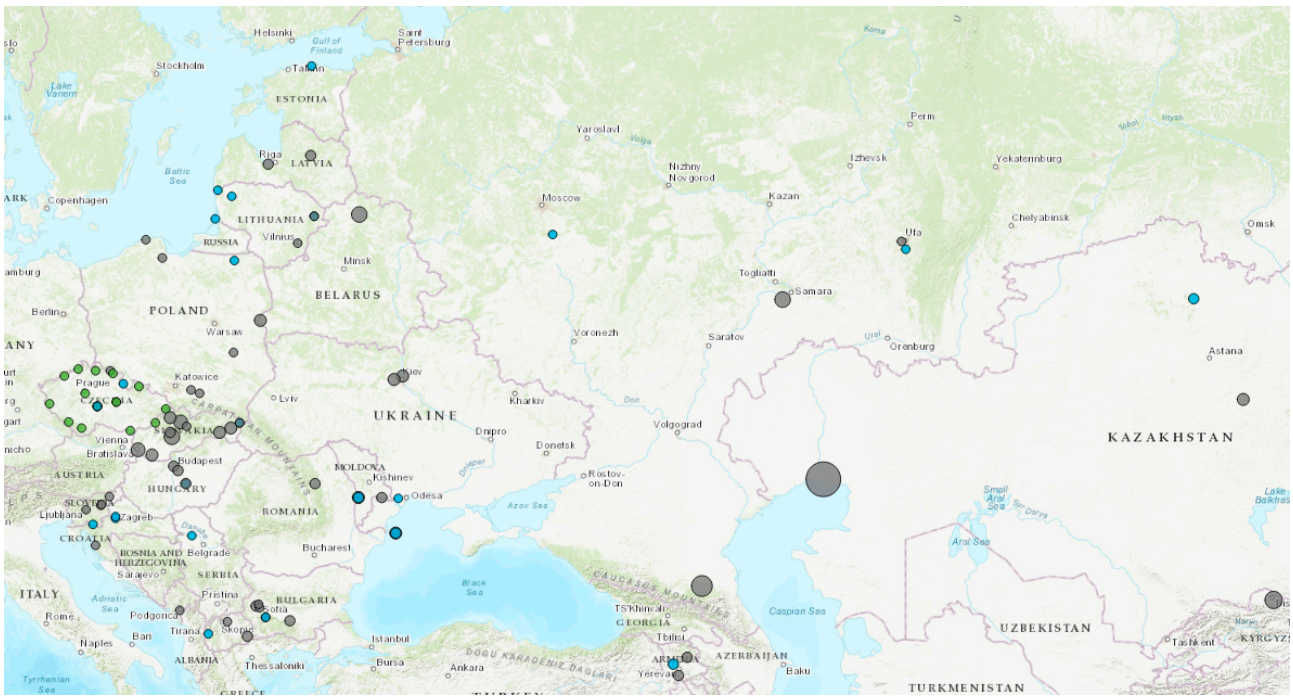


Figure A9 - Trends observed in the CEE region for changes in levels of beta-HCH in ambient air between 2004-2019. Decreasing trend is marked in green, statistically non-significant trend in blue, and no trend/not available trend in grey. Size of the circle represents the median of the concentrations. (source: GMP DWH)

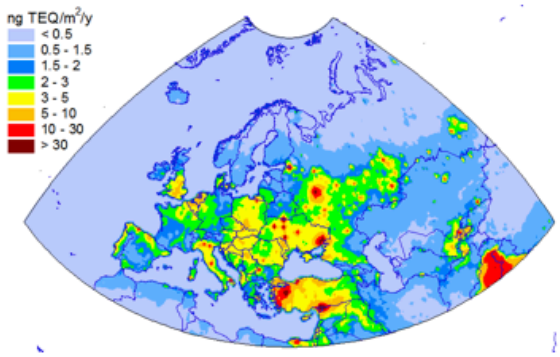
Annex 3 - Information about the Long - Range Transport (related to chapter 5.3.)

EMEP domain - https://en.msceast.org/index.php/pollution-assessment/emep-domain-menu#pcb

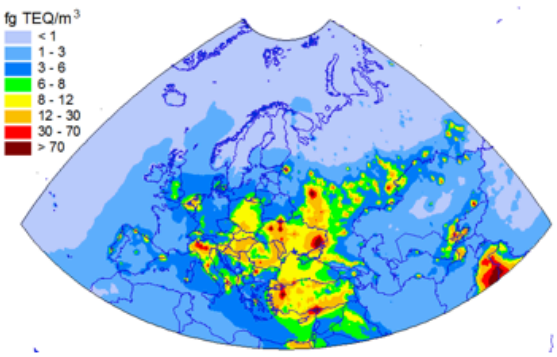
Updated modelling results on some POP pollution levels within the EMEP region for 2018, based on emissions data for 2018 as reported to the EMEP in 2020, are available online. Particularly, spatial distributions of annual mean air concentrations and total annual deposition fluxes of Pb, Cd, Hg, **PCDD/Fs**, B(a)P, B(b)F, B(k)F, IP, **PCB-153 and HCB** for 2018 are presented. Modelling of HM and POP long-range transport and deposition was performed using the latest version of GLEMOS model.

Numerical data are available in the database. The link above provides for modeled images as shown below:

PCDD/F

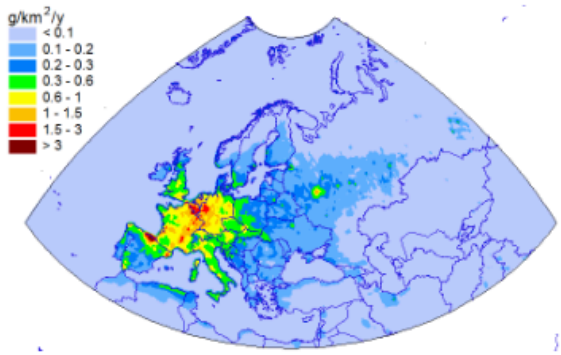


Spatial distribution of **PCDD/F deposition** in 2018, ng TEQ/m²/y

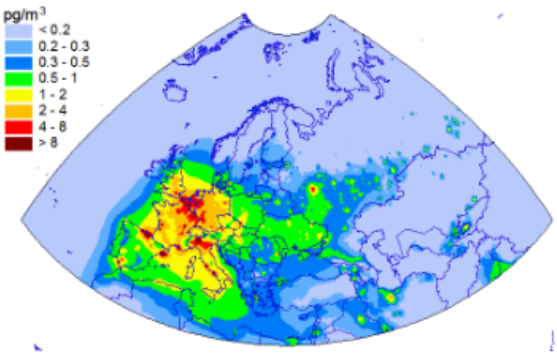


Mean annual **PCDD/F air concentrations** in 2018, fg TEQ/m³

PCB-153

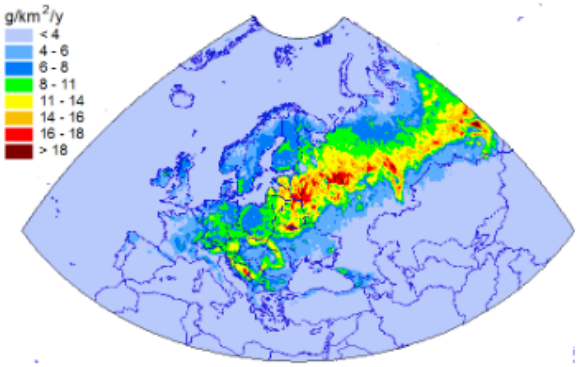


Spatial distribution of **PCB-153 deposition** in 2018, g/km²/y

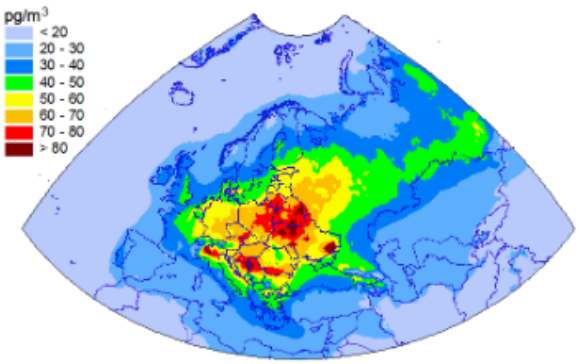


Mean annual **PCB-153 air concentrations** in 2018, pg/m³

HCB



Spatial distribution of **HCB deposition** in 2018, g/km²/y



Mean annual **HCB air concentrations** in 2018, pg/m³

The list below provides for further useful references on POPs long range transport and transboundary air pollution provided in more detailed reports prepared by MSC-East

Assessment of transboundary pollution by toxic substances: Heavy metals and POPs

SUPPLEMENTARY MATERIALS FOR POPs

DataReport 4/2019

https://en.msceast.org/reports/4_2019.pdf

Assessment of transboundary pollution by toxic substances:

Heavy metals and POPs

StatusReport 2/2019

https://en.msceast.org/reports/2_2019.pdf

Assessment of transboundary pollution by toxic substances:

Heavy metals and POPs

Part II

SUPPLEMENTARY MATERIALS FOR POPs

Data Report 2/2020

https://en.msceast.org/reports/2_2020_datrep.pdf

EMEP Status Report 2/2020

July 2020

Assessment of transboundary pollution by toxic substances: Heavy metals and POPs

https://en.msceast.org/reports/2_2020.pdf