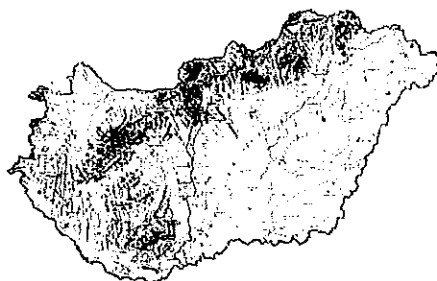




Ministry of  
Environment and  
Water

Ministry of Environment and Water

NIP



**NATIONAL IMPLEMENTATION PLAN OF THE  
STOCKHOLM CONVENTION FOR THE REDUCTION  
OF PERSISTENT ORGANIC POLLUTANTS  
IN THE ENVIRONMENT**

**REPUBLIC of HUNGARY**

Project GF/HUN/01/005 UNIDO on Enabling Activities to Facilitate  
Early Action on the Implementation of the Stockholm Convention on  
Persistent Organic Pollutants (POPs) in Hungary

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**Ministry of Environment and Water**

H-1011 Budapest, Fő u. 44-50. Phone: +36 1 457-3300 Fax: +36 1 201 3056

**Authors (incl. project team):**

Tibor AUER, Klára Réka BOGNÁR, Attila CSEHI, Balázs KESZLER, Péter SZRENKA (VITUKI measurement team), Zsuzsanna BIBÓK, László DOBÓ, Ákos FEHÉRVÁRY, Beátrix KISS, Dr. Kristóf KOZÁK, Dr. Péter LANTOS, Dr. László KOVÁCS, Máté KOVÁCS, Ágnes GULYÁS, Ervin HORVÁTH, László MÓZER, László POHL, József KUTAS, Dr. Tihamér TAJTHY, Dr. Katalin MATYASOVSKY, Dr. Anna PÁLDY, Dr. Pálné SOHÁR, Dr. Béláné VASKÖVI, Gézáne HOLÉCZY, Csaba MARKÓ, József KELEMEN, Dr. László SZABÓ, Tibor KOVÁCS (NGO), Dr. Attila ANTON, Andrásné CHIKÁN, Gabriella GYETVAI, Gábor HASZNOS, Péter MARTH, Dr. Zoltán OCSKÓ, Dr. Ágnes PETHŐ, Dr. János MOLNÁR, Dr. Ferenc CSÁKY, Péter KOVÁCS, Dr. Ferenc LÁSZLÓ, Tamás LOTZ (project manager).

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## Abbreviations

AP - Aarhus Protocol on POPs to the Geneva Convention on LRTAP  
APC - Air Pollution Control  
BAT - Best Available Techniques  
BC - Basel Convention on Hazardous Wastes  
BEP- Best Environmental Practices  
BIPRO- Brancheninitiative für Prozessoptimierung (German Env. Research Institute)  
BOF – Basic Oxygen Furnace  
Borneff 6 – sum of the mostly used six PAH compounds  
CAS- Chemical Abstracts Services  
CEPMEIP - Co-ordinated European Programme on Particulate Matter  
Emission Inventories, Projections  
COP - Conference of the Parties  
DAM - Diósgyőri Acél Művek (Diosgyőr Steel Co.)  
DDE - Dichlorodiphenyl Dichloroethylene  
DDT - Dichlorodiphenyl Trichloroethane  
EC- European Community  
EIs - Environmental Inspectorates  
ELV- Emission Limit Value  
EU – European Union  
EU-R. – Regulation No. 850/2004 of the European Parliament and of the Council  
FAVI – Reporting System on the quality of Groundwaters  
GC- MS (HR) - Gascromatograph mass-spectrometer (High Resolution)  
GDP- Gross Domestic Product  
GEF- Global Environment Facility  
HBB – Hexabromo-bifenil  
HCB- Hexachlorobenzene  
HCH - Hexachloro Cyclohexane  
HUHA – Municipal Waste Utilisation Co. Budapest  
IMC - Inter-ministerial Committee  
IPPC - Integrated Prevention and Pollution Control  
KSH – National Statistical Office  
LE - Law on Environment  
LRTAP – Long Range Transboundary Air Pollution  
LWM - Law on Waste Management  
MARD – Ministry of Agriculture and Rural Development  
MET - Ministry of Economy and Transport  
MEW –Ministry of Environment and Water  
MF - Ministry of Finance  
MH – Ministry of Health  
NAT – National Accreditation Board  
NFR - Nomenclature For Reporting  
NGOs - Non-Governmental Organizations  
NIP- National Implementation Plan  
NKP – National Environment-protection Programme  
NTKSZ Central Service for the National Plant- and Soil Protection  
OÉTI.- National Institution for Food Hygiene and Nutrition  
OHT – National Waste Management Plan of Hungary

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OKKP – National Environmental Remediation Programme  
PAH - Polycyclic Aromatic Hydrocarbons  
PCB - Polychlorinated biphenyl  
PCDD/PCDF- Polychlorinated dibenzo-p-dioxins and dibenzofurans  
PIC - Prior Informed Consent Procedure for Certain Hazardous Chemicals  
and Pesticides in International Trade

POPs- Persistent Organic Pollutants  
R&D – Research and Development  
SC - Stockholm Convention on POPs reduction  
SNAP – Selected Nomenclature for Air Pollutants  
i-TEF - international toxicity equivalence factor  
TEQ - toxic equivalent concentration  
i-TEQ - international toxicity equivalent concentration  
TIM – Monitoring Information System on Soils  
TNMN - Transnational Monitoring Network  
TNO - Nederlandse Organisatie voor toegepast-natuurwetenschappelijk onderzoek  
(Dutch Env. Research Institute)

UN - United Nations  
UN ECE – United Nations European Commission for Economy  
UNEP – United Nations Environment Programme  
UNIDO - United Nations Industrial Development Organization  
u-POP - unintentional POPs  
WHO - World Health Organization  
VITUKI – Research Institute for Environment and Water Management

# National Implementation Plan on POPs reduction

## Republic of Hungary

### EXECUTIVE SUMMARY

#### **Objectives of the Stockholm Convention**

The fundamental objective of the Stockholm Convention (SC), signed by 92 countries and the European Union in 2001, is to protect human health and the environment from persistent organic pollutants (Art. 1). For this end it prohibits the production, use, import and export of chemicals listed in Annex A and restricts the production and use of chemicals listed in Annex B (Art. 3), stipulates measures to reduce or eliminate releases from unintentional production, basically by using best available techniques (Art. 5, Annex C) and to reduce or eliminate releases from stockpiles and wastes (Art. 6).

It also stipulates the development of national implementation plans (Art 7), exchange of information (Art 9), public information, awareness and education (Art. 10), research, development and monitoring (Art. 11). It provides of technical assistance (Art. 12) and for financial resources and mechanism for developing countries and countries with economies in transition (Art. 13, 14). It requires regular reporting (Art. 15) and evaluation of effectiveness (Art. 16). A register is established for specific exemptions (Art. 4) and a process for listing (new) chemicals (Art. 8, Annexes D, E, F).

#### **Main requirements of the Convention**

The following 12 POP substances and substance-groups have been regulated in the Convention, by means of elimination, restriction or emission reduction: aldrin, DDT, dieldrin, endrin, heptachlor, chlordane, hexachloro-benzene (HCB), mirex, toxaphene, polychlorinated biphenyls (PCBs), dioxins and furans. We had undertaken similar obligation in the Aarhus Protocol (AP) within UN/ECE signed in 1998 for further four POP substance groups. These are: polyaromatic hydrocarbons (PAHs), hexachloro-cyclohexane (HCH), hexabromo biphenyl and chlordecone. In the meantime also the EC Regulation 850/2004 (EU-R.) entered into force on the reduction of POP emissions in all Member States, among them in Hungary, too, which includes the requirements of both international agreements mentioned.

The following table demonstrates the regulated POP substances:

POP chemicals	AP (1998) *			SC (2001) **			EU-R. (2004) ***			
							I	II	III	IV
	I	II	III	A	B	C	A	B	A, B	
Aldrin	+			+			+			+
Chlordane	+			+			+			+
Chlordecone	+							+		+
DDT	+	+			+		+			+
Dieldrin	+			+			+			+
Endrin	+			+			+			+
Heptachlor	+			+			+			+
Hexabromobiphenyl	+							+		+
Hexachlorobenzene	+		+	+		+	+		+	+
Mirex	+			+			+			+
PCB <sup>1</sup>	+	+		+		+	+		+	+
Toxaphene	+			+			+			+
Hexachloro-cyclohexane (HCH)		+						+		+
PAH <sup>2</sup>			+						+	
PCDD <sup>3</sup>			+			+			+	+
PCDF <sup>4</sup>			+			+			+	+

1 Polychlorinated biphenyls (209 substances)

2 Polycyclic Aromatic Hydrocarbons (> 100 substances)

3 Polychlorinated dibenzo-p-dioxins (75 substances)

4 Polychlorinated dibenzofurans (135 substances)

\* Aarhus Protocol (AP)

Annex I.: Substances scheduled for elimination

Annex II.: Substances scheduled for restrictions in use

Annex III.: Substances scheduled for emission reduction

\*\* Stockholm Convention (SC)

Annex A: Elimination

Annex B: Restriction

Annex C: Unintentional production

\*\*\* Council Regulation 850/2004/EC (EU-R.)

Annex I A: Banned compounds, both in AP and in SC too

I B: Banned compounds listed only in AP

Annex II.: Substances subject to restrictions

Annex III.: Substances subject to release reduction

Annex IV.: Substances subject to waste management provisions



### **Status of Hungary to the Stockholm Convention**

The SC is directed to the elimination, restriction or emission reduction of the 12 POPs listed. The SC came into force on 17 February, 2004 and prescribes the conditions to be fulfilled by the Parties in order to ban production, use, export and import and to reduce the unintentional emissions of POPs. By the application of best available techniques (BAT) and best environmental practices (BEP), the POP releases into the environment would be considerably reduced or even eliminated.

Hungary signed the SC in 2001 and the Hungarian Parliament has ratified it on February of 2008, thereafter since the 12<sup>th</sup> of June 2008 Hungary becomes a Party of the Convention. Before the ratification of the SC, we intended to set up a thorough assessment the POP releases in the country, developing a comprehensive national implementation plan (NIP) for the reduction of the POP releases to the environment. I.e. we intended to compile one POP-NIP for all the three international agreements.

### **Hungary's National Implementation Plan**

The goal of the NIP is to set up a homogenous framework for all tasks and activities necessary to fulfil the obligations stipulated by the SC and thereby establishing a solid base for the Government to commit itself to the ratification and implementation of the Convention. The structure of the NIP follows the Interim guidance for developing a NIP for the SC by UNEP and the World Bank Group as revised in December 2004.

The basic aim of the NIP is to define measures, which focuses on the following main issues:

- minimize the amount of POPs in the environment, followed by ban, restriction and emission reduction,
- minimize the harmful health impacts through the reduction of POPs in the foods.

### **Elaboration of Hungary's National Implementation Plan**

The elaboration of the National Implementation Plan (NIP) was stimulated and effectively supported by a project financed by the Global Environment Facility (GEF) and executed by the United Nations Industrial Development Organisation (UNIDO) as implementing agency (Project No. GF/HUN/01/05).

The project consists of five phases. After the project preparation Phase I, in Phase II a detailed inventory of POP emissions and stockpiles/deposits was established. The inventory was discussed, evaluated and endorsed by the conference of all stakeholders and national experts.

Because of the very limited number of measured release values the conference requested further measurements instead of use of foreign emission factors.

In Phase III an interim set of priorities was determined, which were discussed and evaluated by a conference, where the importance of own measurements were again stressed. During 2005 and 2006 more measurements were made and a thorough re-assessment of PCB containing oils, resp. apparatuses containing such oils was undertaken. Also a further control of stockpiles of obsolete pesticides as well as of waste deposits was executed. The validity of the priority setting was by these additional measurements confirmed, some changes of the POP inventory are presented in the Annexes of the NIP.

Thereby it became possible to finalize and reinforce the priorities determined earlier and to elaborate Phase IV, namely the National Implementation Plan.

It is to be noted, that the inventory contains data also on polyaromatic hydrocarbons (PAHs), which are not controlled by the SC. These are controlled by the AP (1998) to the Geneva Convention on Long-range Transboundary Air Pollution. Hungary is a Party to this Protocol since 2004. Furthermore, for Hungary, being member state of EU since 1. May 2004, Regulation No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants (EU-R.) is also valid.

This NIP is serving basically the implementation of the SC, it fulfils at the same time the requirements set by the AP and the EU-R. as well.

### **Special problems of Hungary regarding to the compilation of the NIP**

The national implementation plan lists the measures to be done, therefore it should stand on reliable basis. Practically, the national POP inventory should have been the base document for the elaboration of the NIP. However – in order to draw up more reliable measures based on reliable assessments – the necessity of time consuming additional POP measurements were requested during the POP conferences. This claim and some other reasons caused the delay of the compilation of the NIP which is explained as follows:

*a./ based on additional measurements and by consideration of new emission sources the POP inventory was changed in certain parts.*

Most of the emission data of the unintentional POP (uPOP) releases of industrial activities in the POP inventory were based on emission factors taken over from other countries or from expert estimations. This caused remarkable uncertainties, because the emission factors of an activity sometimes have a range of 3-4 order of magnitude, depending the circumstances of

the technology. Consequently, the Inventory and Validation Workshops required domestic **emission measurements**, especially in the metallurgical and power plant sectors, because – out of the dioxin emission data of the waste incineration – there is not any emission limit value prescribed and therefore any measurement obligation of the POP emissions.

Firstly a detailed measurement programme was compiled based on the available National POP Inventory and then the costs of the measurements from **state budget** had to be allocated. We have not had before domestic POP measurement data on the metallurgical and power plant sector at all. It is expected, that based on the measurements the reliability of the POP inventory will be improved.

The results of the measurements and the effect of the consideration of new emission sources have been remarkable, because the emission data of the uPOP releases have been changed: in some cases increased (e.g. dioxins) and in certain cases decreased (e.g. PAHs). The detailed results of the measurements and the new uPOP inventory are shown in the Annexes 1.-6. of the NIP, its summary will be presented also in this ExSum.

Summarized: the own POP measurements changed in a few cases but basically confirmed and validated the priority setting measures to be demonstrated.

*b./ background institutions* of the ministries have been closed, respectively reduced due to reshaping of the governmental structure in Hungary. Hence, firstly the original contracting party of UNIDO (Institute for Environmental Management) was closed, and afterwards also the activity of the new contracting party (Directorate for Environment, Nature and Water) was stopped. Finally the Ministry of Environment and Water took over the tasks and responsibilities. These structural changes hindered the fulfilment of the original schedule.

*c./ the state of the Hungarian budget-deficit* caused a serious financial situation in the country recently. Therefore the contribution of the state budget to the POP measures had to be reduced and the financial contribution of the private sector were to be increased. Consequently, the resource allocation had to be changed without jeopardizing the accomplishment of the NIP.

## Assessment of POPs in Hungary, basic findings of the POP inventory

### *1. Assessment of the amount of POP pesticides*

Being more than 85 % of the territory of the country arable land, Hungary produced and used remarkable amount of pesticides in the period of the intensive agriculture. Between 1950 and 2000 almost 2,4 million tons pesticides were used in the country, 19 % of this (450.000 tons) were products containing POP active substances. Its active POP substances were about 66.500 tons and was distributed in the decades of the last 50 years as follows:

### **Distribution of POP active substance sales by 10-year periods, between 1950-2000**

Active substance	1950-1960	1961-1970	1971-1980	1981-1990	1991-2000	Σ (t)
	(t)	(t)	(t)	(t)	(t)	
DDT	10 128,31	29 347,61	4,35	-	-	39 480,27
HCH	2 555,87	4 399,20	-	-	-	6 955,07
Lindane	2,10	8 787,82	4 314,98	175,65	3,90	13 284,45
Toxaphene (Camphechlor)	153,42	1 595,68	1 807,45	75,20	1,00	3 632,75
Aldrin	0,70	1 893,71	-	-	-	1 894,41
Dieldrin	4,75	259,40	-	-	-	264,15
HCB	0,04	5,17	17,10	-	-	22,31
Chlordane	-	0,10	-	-	-	0,10
2,4,5-T*	0,05	255,05	601,71	68,90	-	925,71
<b>Total</b>	<b>12 845,24</b>	<b>46 543,74</b>	<b>6 745,59</b>	<b>319,75</b>	<b>4,90</b>	<b>66 459,22</b>

\* Not controlled by SC

The maximum of sales of the pesticides containing POP active substances was between 1964 and 1971; in this period the use was steadily 30.000 t/year or more. During this time from the total pesticides the ratio of the agents with POP active substance was also higher, which reached its maximum in 1969, at 72 % in Hungary.

The use of other regulated POP pesticides under the SC were never permitted in Hungary.

**The withdrawal of the active POP substances** can be summarised as follows: the first great active substance withdrawal period started in 1965 with one formulated DDT product (Hungária Matador 5 % powder agent) and last until 1970.

It happened that we were the first one in the world – from 1 January 1968 – phase out the *manufacturing, import and use of products* containing aldrin, dieldrin, pure HCH and DDT active substances.

The second big withdrawal wave was in 1991-1992, when several combination of POP preparations, e.g. Buvinol or agents with 2,4,5-T active substance were banned.

Consequently, the permits for the use of most of the POP active substances were withdrawn more decades ago. The legislation followed the practice: the production, use, export and import of every regulated POP substances, - even more POPs than regulated in the SC - were banned by more ministerial orders of the sixties and the final prohibition of all of these compounds was effected from 2001.

## ***2. Stockpiles of obsolete pesticides, POP pesticides as hazardous wastes***

It is logical consequence of the large amount of POP pesticides used once, that a remarkable amount of uncovered obsolete pesticides with POP content can be found in stocks of former co-operatives, private owners or sometimes hidden. One of the high priority tasks of the NIP is, that as much of this stockpiles as possible should be uncovered and the POP pesticides collected as hazardous waste should be incinerated.

The Hungarian Plant Protection and Soil Conservation Service carried out an investigation countrywide assessing the quantity of these stockpiles. They registered more than 300 tons of obsolete pesticides probably having also POP substances. The most reasonable method for the collection and disposal of this hazardous waste was an offer of the authorities: the collection and disposal of obsolete pesticides was arranged and financed by state budget. After an awareness raising campaign, the task has been successfully performed in two mostly affected counties in 2005, and – as a second phase - around the Lake Balaton in spring 2006.

Result: more than 30 % of the assessed amount of pesticide stockpiles have been collected and environmental friendly disposed.

Further task: continuation of the programme in order to clean-up the whole country from the obsolete pesticides.

## ***3. Identification of PCB use, quantity of PCB containing equipments***

Insulation oils of transformers and capacitors contained PCB in larger quantity. The amount of PCB containing oils in equipments were reassessed in 2003-2004 due to the recommendation of the inventory workshop. Basic changes were found, the amount of PCB containing oils has been much higher than estimated in the POP inventory.

It is remarkable that the amount of PCB containing oils in the equipments increased to appr. 300 tonnes in 2003 and was reduced to appr. 250 tonnes by 2004. In the repeated assessment

also PCB oil content in the transformers were reported, its average was 40-50 dm<sup>3</sup> dielectricum in one transformer.

The capacitors have 3-5 dm<sup>3</sup>/pc. average PCB oil filling and the hydraulic oils of old mining machines have about 10 dm<sup>3</sup>/pc. filling.

Based on the existing EU legislation, this amount of PCB containing oils shall be collected and its safe disposal shall be finished by the end of 2010. This is also a high priority measure of the NIP. Consequently, the investigation of the current capacity for hazardous waste incineration was an important task presented later.

#### ***4. Assessment of unintentionally produced chemicals (u-POPs)***

Assessment of unintentionally produced POPs by certain industrial activities was to be undertaken in order to provide the information required for elaboration and implementation of the action plan under Article 5 of the SC. Thus, the objective was to compile an inventory of the historical and current releases of chemicals listed in Annex C of the SC.

During the inventory phase we had a major problem with the reliability of the preliminary emission inventory of PCBs, HCBs, PAHs and dioxin/furan. The lack of measurements (apart from the waste incineration where it has been obliged) caused uncertainty of the inventory compiled. Therefore the inventory and the priority workshops requested additional measurements at all activities where no measurement data were available. Based on these measurements and taking into account the releases of new activities, a recalculation of the emission inventory was needed. After finishing this rather time consuming additional measurements in the years 2005-2006, the inventory of POP releases to Annex C has been changed, as summarized in the next tables:

Cat.	Source Categories	PCDD/PCDF annual releases (g TEQ/a) in 2004				
		Air	Water	Land	Product	Residue
1	Waste Incineration	0,890	0,000	0,000	0,000	6,225
2	Ferrous and Non-Ferrous Metal Production	28,461	0,000	0,000	0,000	30,652
3	Heat and Power Generation	21,670	0,000	0,000	0,000	2,015
4	Production of Mineral Products	3,347	0,000	0,000	0,000	0,000
5	Transportation	0,685	0,000	0,000	0,000	0,000
6	Uncontrolled Combustion Processes	37,188	0,000	54,375	0,000	0,000
7	Production of Chemicals and Consumer Goods	0,256	0,269	0,000	0,058	0,000
8	Miscellaneous	0,350	0,000	0,000	0,000	1,216
9	Disposal/Landfill	0,000	0,000	0,000	0,000	0,000
10	Identification of Potential Hot-Spots	10,000				
<b>1-10</b>	<b>Hungary 2004 total</b>	<b>102,847</b>	<b>0,269</b>	<b>54,375</b>	<b>0,058</b>	<b>40,108</b>

The annual atmospheric releases of PCB, HCB, and PAHs changed as follows:

Cat.	Source Categories	Annual Air Releases in 2004						SUM 4PAH t/a
		HCB	PCB	BaP	BbF	BkF	IcdP	
		g/a	kg/a	t/a				
1	Waste Incineration	332,811	1,708	0,000	0,000	0,001	0,028	0,029
2	Ferrous and Non-Ferrous Metal Production	3539,672	12,713	0,683	1,492	1,492	0,364	4,031
3	Heat and Power Generation	921,227	68,212	3,436	4,622	1,723	3,028	12,808
4	Production of Mineral Products	74,034	0,012	0,000	0,000	0,000	0,000	0,000
5	Transportation	2,307	12,170	0,630	0,882	0,378	0,630	2,521
6	Uncontrolled Combustion Processes	0,000	0,000	0,000	0,000	0,000	0,000	0,000
7	Production of Chemicals and Consumer Goods	0,000	0,000	0,000	0,000	0,000	0,000	0,000
8	Miscellaneous	0,000	0,000	0,000	0,000	0,000	0,000	0,000
9	Disposal/Landfill	0,000	0,000	0,000	0,000	0,000	0,000	0,000
10	Identification of Potential Hot-Spots	0,000	0,000					0,590
<b>1-10</b>	<b>Hungary 2004 total</b>	<b>4870,051</b>	<b>94,814</b>	<b>4,749</b>	<b>6,996</b>	<b>3,594</b>	<b>4,050</b>	<b>19,979</b>

The outcome of the improved inventory required a reassessment, optionally a revision of the measures to be foreseen. After a careful analysis, the measures of the NIP concerning the emission reduction of POPs has not been changed. The continuation of the measurements is one of the highest priority tasks of the NIP in order to maintain the reliability of the inventory.

### **5. Technical infrastructure for disposal of POPs**

Amount of *waste with POP content* to be disposed based on the revised inventory:

- Oil fillings with PCB content of equipments:	250 tons (2004)
- Obsolete, expired pesticides with POP content:	315 tons (2004)
Total amount of waste with POP content to be disposed:	565 tons

The available hazardous wastes incineration capacity in Hungary is 84.500 tons/year. At the investigation of the disposal capacity we calculated only with the capacity of those hazardous waste incinerators, which meet the strict emission requirements of the EU and national regulation, and which have permission to incinerate wastes with high halogen content.

The total capacity of waste incinerators for combustion of wastes with high halogen content of POPs (incl. the capacitor's oil filling with PCB content and the obsolete stocks of pesticide residues with POP content) is about 2800 t/year. This capacity will meet the demand of incineration quite a lot of other halogenated wastes beyond the POPs listed in the SC and AP.

However, disposal does not mean only incineration but also the handling, the dismantling of the equipments, separation of metal and other parts to be utilised, the collection of the PCB contaminated oils, measurement of the concentration and transport to the incinerators, etc.

According to the practice of the last years we estimated the national disposal capacity of POPs wastes including incineration and other additional activities as about 150 t/year.

I.e. about four years are needed for the disposal of the quantity of 565 tons POP waste with the current domestic capacity conditions. The disposal of POP wastes has to be solved by the end of 2010 based on the recent legislation.

The hazardous waste landfill capacity of 10.000 m<sup>3</sup>/year for filter dust, ash and slag residues having POP – mainly dioxin - content generated by waste incineration is also sufficient.

### **6. Assessment of health hazard due to POP exposition, POP contamination of plants**

There are quite a number of measurement data available on the effects of POP pesticides, PCBs, PAHs, HCB, HCH and partly of dioxins to the health (breast milks, fat tissue) based on the domestic (NEKAP) and international (WHO) measuring programmes. However the number of data and the frequency of the investigations are insufficient, and a special problem is that there is few reliable data on the **impacts and exposition of dioxin** to the health.

**The monitoring of the limit values** of POP content of plants, crops and fruits are being carried out by the Plant Protection & Soil Conservation Service of each county of Hungary. As it was to be expected, the residues of active substances of some chlorinated hydrocarbons



having high fat-solubility were able to be absorbed from the soil. It concerns mainly foodstuffs, fruits, berries of plants with high oil content.

Measurement results of POP residues in the period of 1985-2001 being characteristic of the plants produced in Hungary will be presented below:

**POP residues [mg/kg]**

Active substance	Food, fruits							
	Pumpkin seed oil		Pumpkin seed		Potato		Wild strawberry	
	Number of samples	Measurement	Number of samples	Measurement	Number of samples	Measurement	Number of samples	Measurement
Aldrin+dieldrin	28	0,005-0,2	3	0,001-0,01				
DDT isomers	16	0,001-0,01			6	0,007-0,011		
Lindane	32	0,001-0,012	6	0,001-0,005	3	0,002-0,009	5	0,004
HCH isomers	38	0,001-0,008	6	0,003-0,007				
Toxaphene	1	0,32						

The results of the investigations are in the range of the detection limit, or have shown very low contamination, however in the recent past it has been approved that the 0,01 mg/kg limit value of drinks were exceeded and in the lower layers of soil there are still residues of dieldrin absorbed by the longer root-system of pumpkin.

The task of the service-network of the plant protection is to control the limit values for the POP content of foods, vegetables, fruits, crops. The existing investigating staff should be strengthened, especially because the illegal use of pesticides is increasing.

### **7. Research and development**

Currently about 50-70 laboratories are accredited in the country for sampling and analysing organic pollutants. Amongst them are the laboratories of the environmental inspectorates and of the Ministry of Health in each county, furthermore laboratories of universities, national background institutions and chemical laboratories of a few companies. The analytical background *for sampling and analysis of dioxin & furan emissions is also available* (5-7 laboratories, three of them represent the most advanced high resolution type of MS GC HR equipments) which meet the updated highest demand on measurements.

Further task is the completion of standards yet missing on PAHs, PCBs, HCB and PCDD/DF content of some food products. Specification of some BATs for POP emitting activities are also necessary.

**Legislative background, general evaluation of the inventories and conclusions:**

Due to the EU membership, Hungary had to transpose every EU regulation concerning the POP issues, which have at least as strict provisions as of the SC. Therefore the **legislative background** of the reduction of POPs in the country is settled.

To sum up the evaluation of the POP inventory can be stated that the POP emission of Hungary is low compared with the emission rate of other countries in the region.

The main reason of the low POP release might be the extraordinary high rate of natural gas consumption (the nat. gas within the primary energy sources represents more than 40 %, with this rate Hungary is the second in Europe after the Netherlands). Its consequence is the proportional decrease of the use of solid and liquid hydrocarbons in the country. An other reason of the low POP's release is a permanent decrease of the domestic metallurgical sector, which would be otherwise an important source of the POP emissions.

However, it is fact that partly due to the introduction of more strict regulations forced by the EU legislations in the past decade and partly by the early ban of the most pesticides controlled by the SC, the POP release to the environment has been basically reduced in the country.

Also the *energy efficiency* has been improved by the introduction of energy efficient technologies, by combined heat and power generation (co-generation), by the co-incineration of wastes in the cement factories, etc. in Hungary.

**Detailed Action Plan (activities, strategies)*****A./ Activities to strengthen institutional background***

1. Continuing the activity of the Inter-ministerial Committee (IMC) for the information exchange, for the discussion of the actions on the expert level, to harmonize the tasks concerning two or more ministries, the regulation of the new chemicals, and for periodical control of measures taken.
2. Regular training on annual conferences for Inspectors of the authority in the first instance, about the changes on the regulation regarding POP releases, controlling tasks, and on application of Best Available Techniques (BAT's), especially on technologies listed on the II and III part of the Annex "C" of the Stockholm Convention.

***B./ Activities regarding PCBs and PCB containing articles / equipments***

1. Cleaning and optional utilization of the housing of the equipment and destruction of PCB contents has to be finished by 31st of December 2010., regarding to the 5/2001 (II.23.) MEW decree on the detailed regulations of the treatment of Polychlorinated biphenyls, and Polychlorinated terphenyls, and equipment containing them.
2. Checking the fulfillment of the measures in the first point is the responsibility of the Environmental Inspectorates as the authority in the first instance.

***C./ Activities to reduce unintentional POP releases, monitoring***

1. Measurements of emission concentration in samples from air, technological waste waters and residues of POP emitting industrial technologies and sources. Compilation of Measurement Plan, coordination of measurements, purchase of possible international financial resources.
2. Regarding to the measurements, evaluation the POP emissions of an industrial sector and taking the appropriate measures to introduce necessary steps (e.g. filtering, flue gas cleaning, etc.).
3. Translation of available POP BAT documents and elaboration of guidelines, furthermore extension of this activity to other POP emitting industrial technologies
4. Regular control of the introduction and implementation of POP-BATs by the enterprises by the Environmental Inspectorates.

***D./ Activities to reduce POP releases from obsolete stockpiles and wastes***

1. Cleaning of 14 counties (Békés, Borsod-Abaúj-Zemplén, Csongrád, Hajdú-Bihar, Heves, Nógrád, Szabolcs-Szatmár-Bereg, Jász-Nagykun-Szolnok, Baranya, Tolna, Fejér, Komárom-Esztergom, Győr-Moson-Sopron, Vas) not yet cleaned from pesticide wastes including wastes containing POPs, during the collecting and treatment actions.

2. The collection and final-treatment of the remaining 200 tons of obsolete pesticide waste in the Country is regulated by the 98/2001 (VI.15.) Governmental Decree on the terms and conditions of the treatment of hazardous wastes, but with the purchase of possible international financial resources, and with a possible future regulation on the elimination of obsolete pesticide wastes could be done to encourage the process.

***E./ Actions on raising awareness, role of NGOs, information, education***

1. Elaboration of easy-to-understand information booklets for professional organizations, NGOs and the general public on the characteristics and effects of POPs and on their elimination.
2. Involvement of NGOs showing interest in the POP issue, in decision-making processes and in preparation of POP legislation.

***F./ Actions on reporting***

1. Regularly reporting to international organizations regarding to the requirements of International POP agreements and the 850/2004 EC Regulation.
2. Deadlines, see table 1.

<b>Content of the Report</b>	<b>Stockholm Convention</b>	<b>850/2004/EC Regulation</b>	<b>Aarhus Protocol</b>
Data on production and use of POP chemicals are banned as pesticides or industrial chemicals	Annual report to the Secretariat of the Stockholm Convention	Annual and three-yearly report (EU)	Annually until the 15th of Feb. On the second year after the reporting year
Unintentional emissions of Thermal-industrial activities: PCB, PAH, PCDD/DF and HCB emission releases data to air, water, soil, and joint analysis report	Regarding to COP-2/30, except PAHs when a country becomes party, and every four year after	Two years after the 1, § of Art, 6 of the EU-R come into force and than every three years	PCDD/DF, HCB and PAHs: annually until the 15th of Feb. On the second year after the reporting year on the common reporting format of CLRTAP

Table 1. Reporting obligations

*G./ Actions on research, development, and monitoring*

1. Build up a unified position with the convene of the Inter-ministerial Committee, in case of changes on the Convention, Protocol and the EC Regulation, on the decision of up taking of new chemicals to any of the international agreements, and on the regulation of any product, if they containing POPs.

**Total resource requirement** (including contribution of private sector as well) for the implementation of the NIP for the *next five years amounts about 20-25 million USD.*

***Feasibility of the NIP and general conclusion:***

*Hungary has met already most of the requirements of the Stockholm Convention and is fully committed to comply with the planned further tasks of the NIP.*

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## 1. Introduction

This National Implementation Plan (NIP) compiles the measures to be introduced in Hungary in order to perform the requirements of the Stockholm Convention (SC), i.e. the protection of human health and the environment from persistent organic pollutants, abbreviated POPs (Art. 1 of SC). The SC lists twelve POPs which have similar physical, chemical, and biological characteristics. They possess toxic properties, resist degradation, bioaccumulate and are transported, through air, water and migratory species, across international boundaries and deposited far from their place of release, where they accumulate in terrestrial and aquatic ecosystems.

For this end it prohibits the production, use, import and export of chemicals listed in Annex A and restricts the production and use of chemicals listed in Annex B (Art. 3), stipulates measures to reduce or eliminate releases from unintentional production, basically by using best available techniques (Art. 5, Annex C) and to reduce or eliminate releases from stockpiles and wastes (Art. 6).

It also stipulates the development of national implementation plans (Art 7), exchange of information (Art 9), public information, awareness and education (Art. 10), research, development and monitoring (Art. 11). It provides of technical assistance (Art. 12) and for financial resources and mechanism for developing countries and countries with economies in transition (Art. 13, 14). It requires regular reporting (Art. 15) and evaluation of effectiveness (Art. 16). A register is established for specific exemptions (Art. 4) and a process for listing (new) chemicals (Art. 8, Annexes D, E, F).

Next 12 POP substances are regulated in the SC by means of elimination, restriction or emission reduction: aldrin, DDT, dieldrin, endrin, heptachlor, chlordane, hexachloro-benzene (HCB), mirex, toxaphene, polychlorinated byphenils (PCBs), dioxins / furans.

Hungary also intend to meet similar obligations of the Aarhus Protocol (AP) within UN/ECE signed in 1998 for further four POP substance groups. These are: polyaromatic hydrocarbons (PAHs), hexachloro-cyclohexane (HCH), hexabromo-biphenyl and chlordecone.

In the meantime also the EC Regulation 850/2004 (EU-R.) entered into force on the reduction of POP emissions in all Member States of the EU, among them in Hungary, too, which includes the requirements of both international agreements mentioned. The following table summarizes the regulated POP substances of the international agreements:

POP chemicals	AP (1998) *			SC (2001) **			EU-R. (2004) ***			
							I	II	III	IV
	I	II	III	A	B	C	A	B	A, B	
Aldrin	+			+			+			+
Chlordane	+			+			+			+
Chlordecone	+							+		+
DDT	+	+			+		+			+
Dieldrin	+			+			+			+
Endrin	+			+			+			+
Heptachlor	+			+			+			+
Hexabromobiphenyl	+							+		+
Hexachlorobenzene	+		+	+		+	+			+
Mirex	+			+			+			+
PCB <sup>1</sup>	+	+		+		+	+			+
Toxaphene	+			+			+			+
Hexachloro-cyclohexane (HCH)		+						+		+
PAH <sup>2</sup>			+							+
PCDD <sup>3</sup>			+			+				+
PCDF <sup>4</sup>			+			+				+

1 Polychlorinated biphenyls (209 substances)

2 Polycyclic Aromatic Hydrocarbons (> 100 substances)

3 Polychlorinated dibenzo-p-dioxins (75 substances)

4 Polychlorinated dibenzofurans (135 substances)

\* Aarhus Protocol (AP)

Annex I.: Substances scheduled for elimination

Annex II.: Substances scheduled for restrictions in use

Annex III.: : Substances scheduled for emission reduction

\*\* Stockholm Convention (SC)

Annex A: Elimination

Annex B: Restriction

Annex C: Unintentional production

\*\*\* Council Regulation 850/2004/EC (EU-R.)

Annex I A: Banned compounds, both in AP and in SC too

I B: Banned compounds listed only in AP

Annex II.: Substances subject to restrictions

Annex III.: Substances subject to release reduction

Annex IV.: Substances subject to waste management provisions

### Status of Hungary to the Stockholm Convention

The SC is directed to the elimination, restriction or emission reduction of the 12 POPs listed. The SC came into force on 17 February, 2004 and prescribes the conditions to be fulfilled by the Parties in order to ban production, use, export and import and to reduce the unintentional emissions of POPs. By the application of best available techniques (BAT) and best environmental practices (BEP), the POP releases into the environment would be considerably reduced or even eliminated.

Hungary signed the SC in 2001 but has not yet ratified it. The Hungarian Parliament has ratified the Stockholm Convention on February of 2008, thereafter since the 12<sup>th</sup> of June 2008 Hungary becomes a Party of the Convention.

### Detailed requirements of the Stockholm Convention

#### *Annex A: Elimination – Part I*

Chemicals	Activity	Specific exemption
Aldrin CAS No.: 309-00-2	Production	none
	Use	local ectoparasiticide insecticide
Chlordane CAS No.: 57-74-9	Production	as authorized to the parties listed in the register
	Use	local ectoparasiticide insecticide termiticide termiticide in buildings and dams termiticides in roads additives in plywood glues
Dieldrin CAS No.: 60-57-1	Production	none
	Use	in agricultural operations
Endrin CAS No.: 72-20-8	Production	none
	Use	none



Chemicals	Activity	Specific exemption
Heptachlor CAS No.: 76-44-8	production	none
	Use	termiticide termiticide in house construction termiticide (underground) wood treatment for usage in underground cabled vaults
Hexachlorobenzene CAS No.: 118-74-1	Production	as authorized to the parties listed in the register
	Use	intermediate product solvent in pesticides closed system site limited intermediate
Mirex CAS No.: 2385-85-5	Production Use	as authorized to the parties listed in the register Termiticide
Toxaphene CAS No.: 8001-35-2	Production Use	None None
Polychlorinated biphenyls (PCB)	Production Use	None products used according to regulations of part II of this annex

### ***Annex A: Elimination – Part II***

#### **Polychlorinated biphenyls**

Each Party shall *inter alia*:

1. Make determined efforts to identify, label and remove from use equipment containing greater than 10 per cent polychlorinated biphenyls and volumes greater than 5 liters;
2. Make determined efforts to identify, label and remove from use equipment containing greater than 0.05 per cent polychlorinated biphenyls and volumes greater than 5 liters;
3. Endeavor to identify and remove from use equipment containing greater than 0.005 percent polychlorinated biphenyls and volumes greater than 0.05 liters;
4. Use only in intact and non-leaking equipment and only in areas where the risk from environmental release can be minimized and quickly remedied;
5. Make determined efforts to identify, label and remove from use equipment containing greater than 10 per cent polychlorinated biphenyls and volumes greater than 5 liters;

6. Make determined efforts to identify, label and remove from use equipment containing greater than 0.05 per cent polychlorinated biphenyls and volumes greater than 5 liters;
7. Endeavor to identify and remove from use equipment containing greater than 0.005 percent polychlorinated biphenyls and volumes greater than 0.05 liters;

**Annex B: Restriction – Part I**

Chemicals	Activity	Acceptable purpose or specific exemption
<b>DDT</b> 1,1,1-trichloro-2,2-bis (4-chlorophenyl) ethane CAS No.: 50-29-3	production	<u>acceptable purpose:</u> used for coping with biological disease carriers in accordance with part II of this annex <u>specific exceptions:</u> intermediate during the production of dicofol intermediate product
	use	<u>acceptable purpose:</u> used for coping with biological disease carriers in accordance with part II of this annex <u>specific exceptions:</u> - production of dicofol - intermediate product

**Annex B: Restriction – Part II****DDT (1,1,1-trichloro-2, 2-bis (4-chlorophenyl) ethane)**

- The production and use of DDT shall be eliminated except for Parties that have notified the Secretariat of their intention to produce and/or use it.
- Every three years, each Party that uses DDT shall provide to the Secretariat and the World Health Organization information on the amount used, the conditions of such use, and its relevance to that Party's disease management strategy.

**Annex C: Unintentional production**

This Annex applies next POPs when formed and released unintentionally from anthropogenic sources:

**Chemicals**

Polychlorinated dibenzo-p-dioxins and dibenzofuranes (PCDD/PCDF)

Hexachlorobenzene (HCB) (CAS No.: 118-74-1)

Polychlorinated biphenyls (PCB)

Furthermore, this Annex lists industrial sources, which have the capability of significant releases of the mentioned POPs into the environment. Article 5 of the SC details the obligations concerning Annex C POPs. The general objective of this part is that each Party shall take certain measures to reduce the total releases derived from anthropogenic sources of each of the chemicals listed in Annex C, with the goal of their continuing minimization and, where feasible, ultimate elimination.

### **Hungary's National Implementation Plan**

The goal of the NIP is to set up a homogenous framework for all tasks and activities necessary to fulfil the obligations stipulated by the three international POP agreement, including the SC and thereby establishing a solid base for the Government to commit itself to the ratification and implementation of the Convention.

The structure of the NIP follows the Interim guidance for developing a NIP for the SC by UNEP and the World Bank Group as revised in December 2004.

The basic aim of the NIP is to define measures, which focuses on the following main issues:

- minimize the amount of POPs in the environment, followed by ban, restriction and emission reduction,
- minimize the harmful health impacts through the reduction of POPs in the foods.

### **Elaboration of the National Implementation Plan**

The elaboration of the National Implementation Plan (NIP) was stimulated and effectively supported by a project financed by the Global Environment Facility (GEF) and executed by the United Nations Industrial Development Organisation (UNIDO) as implementing agency (Project No. GF/HUN/01/05).

The project consists of five phases. After the project preparation *Phase I*, in *Phase II* a detailed inventory of POP emissions and stockpiles/deposits was established. The inventory was discussed, evaluated and endorsed by the conference of all stakeholders and national experts. Because of the very limited number of measured release values the conference requested further measurements instead of use of foreign emission factors.

In *Phase III* an interim set of priorities was determined, which were discussed and evaluated by a conference, where the importance of own measurements were again stressed. During 2005 and 2006 more measurements were made and a thorough re-assessment of PCB containing oils, resp. apparatuses containing such oils was undertaken. Also a further control of stockpiles of obsolete pesticides as well as of waste deposits was executed. The validity of the priority setting was by these additional measurements confirmed, some changes of the POP inventory are presented in the Annexes of the NIP.

Thereby it became possible to finalize and reinforce the priorities determined earlier and to elaborate *Phase IV*, namely this National Implementation Plan.

It is to be noted, that the inventory contains data also on polyaromatic hydrocarbons (PAHs), which are not controlled by the SC. These are controlled by the AP (1998) to the Geneva

Convention on Long-range Transboundary Air Pollution. Hungary is a Party to this Protocol since 2004. Furthermore, for Hungary, being member state of EU since 1. May 2004, Regulation No 850/2004 of the European Parliament and of the Council of 29 April 2004 on persistent organic pollutants (EU-R.) is also valid.

### **Hungarian implementing agency of the project**

In the past years two background institutions of the Ministry of Environment and Water were assigned to set up the POP project team in order to elaborate the NIP. Finally – after reorganisation of the state administration and closing down of both background institutes – itself the ministry took over the tasks and responsibilities of the POP Project Team.

The POP Project Team consists of experts of all area of the POP issues having experiences and capabilities of the air, water and soil pollution control and of waste management. It coordinates all the national activities directed towards the preparation of a comprehensive National Implementation Plan (NIP).

The multi stake-holder committee – apart of the environmental specialists – consists of experts of the health, agriculture, economy and finance issues and of the NGOs. They have elaborated the several chapters of the Hungarian POP Inventory and drafted the necessary measures to be done.

The Inter-ministerial Committee has the responsibility to formulate the main tasks and to control and harmonize on high level the different activities following by the NIP. A part of the institutional strenghtening of the NIP is the proposal that this useful and effective board would continue its work during the implementation of the NIP in the next years as well.

## 2. Country baseline

### 2.1 *Country profile*

#### **2.1.1 Geography and population**

The territory of Hungary covers 93 000 square kilometers, its population is 10.1 million. Although about 85% of the territory is arable land, the structure of economy is basically characterized by industrial activity. The geographic position of the country with respect to possible water pollution is specific, because the Danube and the rivers having their sources in the Carpathians are flowing through the middle of the country, actually 94% of the waters leaving the country have their sources outside the country, therefore Hungary is directly interested in minimal pollution of the rivers. As a consequence of this situation we participate in a number of international programs, which serve the regular monitoring the quality of surface waters.

#### **2.1.2 Political and economic profile**

In the early nineties, when the basic change of the structure of the economy from a planned system to market economy took place, the output of the country's economy has drastically dropped and at the same time the rate of inflation has risen to 20-30%. It was however a positive consequence of the collapse of the former socialist industrial structure. that the state of the environment has significantly improved, because quite a number of heavily polluting industrial companies went bankrupt. Growth of the economy started in the second half of the nineties, however without a proportional of emission of pollutants. This was first of all the effect of more strict environmental regulations.

#### **2.1.3 Profiles of economic sectors**

The output of macroeconomy, and connected with it, the output of industry can be characterized by the Gross Domestic Product (GDP). We were able to reach again the 1989 level of GDP only ten years later. The growth of economy, lead by exports, has started encouragingly between 1996 and 2000, but after 2000, in connection with worldwide recession, dropped to some extent. Correspondingly the growth rate of industrial production of 8% and a similar rate of sales in 2000 has dropped to 3% in 2002.

For compiling the POP inventory the economic data of the years 1998 to 2005 were taken into account, therefore in the next table characteristic macro-economical data of those years are presented:

Year	Gross Domestic Product (GDP) without inflation (billion HUF)	Consumer price index	GDP volume index, taking into account the inflation too	Unemployment rate
1998	10.087	114,3	104,9	7,8
1999	11.393	110,0	104,2	7,0
2000	13.272	109,8	105,2	6,4
2001	14.849	109,2	103,8	5,7
2002	16.980	105,3	103,3	5,8
2003	18.651	104,7	103,4	5,9
2004	20.429	106,8	105,2	6,1
2005	21.802	103,5	104,1	7,2

Source: Eurostat, 05. July. 2006

#### 2.1.4 Environmental overview

Compliance with new legal regulations or joining to international agreements have in most cases also economic and social consequences. Elimination and/or restriction of emissions requires investment. the cost of which the companies try to enforce in the price of their products, and this may have economic, financial (inflationary) and social effects.

Reduction of POP emissions, if the regulation bans the sale and use of certain formerly produced/used products may have direct social effects because of loss of job opportunities. The use of certain compounds is explicitly necessary to prevent certain diseases (e.g. DDT against the pathogen of malaria), but this is not typical for Europe, European countries store at most small quantities of such compounds as sanitary reserves for case of emergency.

International POP agreements coming domestically in force have little economic effects, because the active ingredients of the pesticides controlled by these agreements were long ago banned in Hungary, control measures to reduce emissions were partly regulated by earlier legislation (e.g. emission limit concentration of dioxins from waste incineration are in force since 1991) and last but not least significant investments executed in last ten years to reduce the emission of pollutants (e.g. flue gas desulphurization and filtering of dust at power stations) contributed additionally to the reduction of POP emissions. At the same

time the development of adequate infrastructure (measuring instruments, monitoring, expert personnel, etc.) has and will have funding requirements. Application of Best Available Techniques (BATs) for new activities is in Hungary since 2001 obligatory, for existing equipment it will be obligatory after 31 October 2007.

For studying social effects the rates of unemployment and inflation are the generally applied main indicators. As it can be seen from the table, the consumer price index dropped from 2000 below 10%, in 2005 it was 3.5%. The rate of unemployment showed a similar decreasing tendency at the beginning of the decade: from 2000 on has dropped below 7%, but in 2005 raised again above 7%.

It is to be mentioned, that the ratio of natural gas among the primary energies is in Hungary the second largest in Europe behind the Netherlands, today it is more than 40%. The price subsidy of natural gas for the population has played a vital role in changing from solid fossil fuels to natural gas by a vast majority of the population.

However the price subsidy system is now going to be substantially changed and therefore it is expected, the present fuel structure of the population, which is now favorable from environmental aspects, will change and the ratio of fuels with higher pollution potential will increase.

Banning or restricting the use of POP chemicals might have such consequences in the application of pesticides, that without the use of these active ingredients crop yields would decrease and this would cause troubles of subsistence for people living from agriculture. However practice proves that the majority of these active ingredients has been successfully replaced by compounds which are less harmful to human health.

Based on these considerations one can declare, that banning the use and restricting the emissions of POP compounds listed by the international agreements does not cause direct social or subsistence problems in Hungary.

Furthermore, there is no such sanitary emergency situation in the country, which would give reason to stockpile any of these compounds (such emergency situation is nowadays restricted mostly to the so-called malaria zone).

## **2.2 Institutional, policy and regulatory framework**

### **2.2.1 Environmental policy, sustainable development policy, general legislative framework**

The basis of domestic environmental regulation is the Act on the Protection of the Environment, entered into force in 1995. From this Act it can be deduced, that all international agreements aiming at the minimalization of impacts of POPs to humans are signed by the country and entered into force or will enter into force.

Among the agreements somehow related to the POP agreements Hungary has signed the Basel Convention and the Rotterdam (PIC) Convention, as well as the agreements related to sustainable development, in this way also the Kyoto Protocol on the reduction of greenhouse gas emissions.

### **2.2.2 Roles and responsibilities of ministries, agencies and other governmental institutions involved in elimination, resp. emission reduction of POPs**

Direction, supervision and control of tasks related to persistent organic pollutants (POPs) is provided for: by the relevant ministries, their background institutions, the Environmental Inspectorates exercising the role of authority, further by a number of state, municipal and civil institutional organizations participating in the POP issue. Tasks and responsibilities are presently distributed among the following partners:

#### ***I. Ministry of Environment and Water***

Supervision of the execution and coordination of tasks for the protection of the environment is the obligation of the prevailing minister responsible for the environment. This is contained in Government Decree 155/2002.(VII.9). Thus the responsibility for preparation, execution and control of the stipulations of the Stockholm Convention, Aarhus Protocol and European Regulation lies primarily with the Ministry of Environment and Water, for the execution of POP related tasks belonging to the competence of other ministries ( Ministry of Agriculture and Rural Development, Ministry of Health, etc.) the ministers of the relevant ministries are responsible.

Within the Ministry of Environment and Water (MEW) a number of units are engaged in POP related tasks. After a thorough reorganization of MEW in summer of 2006 the following



departments bear the main responsibilities:

a) *Department for Environmental Development of the State Secretariat for Environmental Economy Policy*

Direction and control functions related to POPs are located here as well as the National Focal Point of the Stockholm Convention. The Focal Point's task is to participate in the international POP conferences, to prepare the home legislation of international agreements/decisions, to initiate new regulations if necessary. A specific task of the department is to elaborate adequate regulations for the prevention and control of POP emissions, furthermore to report annual atmospheric emission data to the relevant international organizations.

The department is responsible for individual optional tasks for handling POPs and for the control of execution, such as the collection and handling/managing of obsolete pesticides and/or their residues and containers, and assessment and destruction of PCB containing equipment.

b.) *Department for Environmental Economy of the State Secretariat for Environmental Economy Policy*

The task of this department contains the direction of programs for the control of POP containing wastes, assessment of POP containing deposits, preparation of new landfills, control of incineration facilities burning POP containing wastes, etc.

c.) *Water Framework Directive Department of the State Secretariat for Water Policy*

The POP related task of this department is to elaborate measures and legal regulations to prevent POP contamination of surface and underground waters and of soil. Its task is the planning and control of the remediation programme of the (eventually with POPs) contaminated sites.

d.) *Legal enforcing and authority organisation: National Inspectorate for Environment, Water and Nature Protection and its regional organisations*

The implementation of the environmental protection laws and regulations and the first instance level authority tasks are carried out in practice by the national network of the environmental inspectorates and water directorates, and – as a second instance level authority – the Main Inspectorate for Environment, Water and Nature Protection (hereinafter Main Inspectorate); the tasks and competence are regulated in Government Decree No. 183/2003 (XI. 5.).

The national network of environmental inspectorates, divided into ten units determined upon regions, is responsible for the local implementation of the regulations and control of POPs.

Furthermore, the inspectorates play significant role in assessing POPs, as samplers and analysers of measurements of the authority. Management and updating of the database from the samplings and analyses also belong to the competence of the inspectorates.

*The Main Inspectorate*, as part of its basic activities falling under the responsibilities of the state, fulfils the following tasks related to persistent organic pollutants:

- exercises
  - public authority environmental, nature protection and water affairs jurisdiction at the level of first instance as specified by separate rules of law,
  - jurisdiction at the level of second instance, in the case of environmental, nature protection and water affairs, as specified by separate rules of law;
- provides data, coming into being in the course of its activity required for governmental work;
- analyses and evaluates the reinforcement of the rules of law falling under its responsibilities and scope of power, the fulfilment of obligations in force;
- co-operates with the units of the Ministry, in accordance with its organisational and operational regulations;
- manages public authority registration as specified by rules of law.

*The Regional Environmental Inspectorates:*

The Regional Inspectorates, as part of their basic activities falling under the responsibilities of the state carry out the following tasks related to the persistent organic pollutants:

- exercise public authority environmental and nature protection jurisdiction at the level of first instance as specified by rules of law;
- co-operate, in the interest of environment protection, with local governments, natural persons and their organisations, with economic organisations and their organisations for safeguarding their interests and with other institutions;
- take part in the accomplishment of international tasks relating to the enforcement of environmental interests;
- processing data concerning the state of environment available and give appropriate information on them;

- give expert opinion on decree- and provision drafts of local self-governments relating to environmental issues, on their plan drafts influencing the state of environment and on their environmental programs;
- fulfil, in accordance with the scope of duties as established by the minister, the territorial responsibilities for the operation of measuring, monitoring and controlling system established to monitor the state and use of environment, to measure, gather, process and register its tolerance data; besides, they fulfil territorial responsibilities falling under their scope of duty necessary for the operation of the National Information System for Environment (hereinafter: Information System) and co-operate with other controlling, monitoring and information systems;
- gather data falling under their scope of duty necessary for the operation of the Information System and make them available to the Information System;
- co-operate in the accomplishment of tasks relating to the exploration of the state of environment and the wished state (target state) of environment and to its registration;
- register the fact, extension and type of lasting environmental damages established by public authority provisions in force in the registration of real estates; besides, they make the necessary steps towards cancellation or modification if changes occur;
- help local governments operating in their working areas by supporting them in their public authority environmental tasks;
- accomplish regional tasks, specified by rules of law, relating to the direction of fixing environmental damages;
- have a registration of environmental permits, environmental operation permits and other public authority decisions issued in cases specified by rules of law, and of the declarations of public expert authorities;
- give expert opinion, in the final settlement and liquidation, on the contract, the interim balance and the proposal on the distribution of wealth made by the liquidator in order to execute the decision on the fixing of environmental damages;
- prepare regional waste management plan;
- prepare water protection action program and pollution control action plan;
- define individual water basin limit value;
- take part in the accomplishment of tasks aiming at the promotion of environmental public awareness, take part in research and educational activities and in the dissemination of information relating to the environment;

- Co-ordinate the co-operation with the environmental civil organisation (eNGOs) from the side of authority, practical enforcement of the roles of state.

## ***II. Ministry of Health***

The minister coordinates the tasks for preserving human health, including - inter alia - the assessment of forms and scale/measure of health damages and the possibilities of curing, publications of solutions, establishing chemical safety. These cover also POP related issues. The execution of the tasks is distributed between several institutions. These and their delegated tasks are:

### *National Public Health and Medical Officer's Service (ÁNTSZ)*

Its POP-related tasks are:

Carries out services in the field of public health (environmental and town health, feed nutritional health, labour health, chemical safety), health development (health protection, health education and prevention of diseases), and also in the field of the health administration and co-ordination.

There are two, especially involved background institutions in the POP reduction tasks:

+ *National Institute of Environmental Health (OKI)* of – analyses and collects data, makes examinations on the impact of persistent organic pollutants on human health, and manages the PIC Convention;

+ *National Institution for Food Hygiene and Nutrition (OÉTI)*– analysis and collects data on the POP content of food, examines the POP exposition of human body, breast milks, etc.

## ***III. Ministry of Agriculture and Rural Development***

In Hungary about 85% of the territory is arable land and can be used for agriculture or forestry, thus the quality of soil and of waters are in this branch of economy one of the most important conditions of production. Prevention of contamination of soil and water and elimination of existing contaminations is a basic objective of agriculture. The contamination caused by agricultural activity is characteristically of diffuse nature. Persistent organic pollutants occur in agriculture mostly as pesticides. The use of most of them is prohibited long since, but these compounds can yet be found in store-houses, in living organisms, in the soil and in natural waters.

The following tasks of the minister are connected with the regulation of POP containing

compounds:

- agro-environment economy
- direction of soil and plant protection, of plant health and health in animal husbandry
- protection of quality of arable land., cartography and cadastral issues, furthermore the central direction of agricultural water management.
- Overall food safety, crop helath, and animal feed safety.

The Central Soil and Plant Protection Service, one of the background institutions of the MARD is especially taking part in the program of POP elimination. The tasks of the Central Soil and Plant Protection Service and of its local County Soil and Plant Protection Stations are:

*a) Central Soil and Plant Protection Service*

- it is responsible for the registration, licensing, placing on the market and withdrawal of pesticides
- assessment/registration of pesticide residues and contaminated sites, handling the database of the residues and contaminated sites
- support of specific sub-programs of the (national) agro-environmental program
- running the Soil Information Monitoring network (TIM).

*b) County Soil and Plant Protection Service Stations:*

- assessing with guidance of the Central Service the damages caused by soil contaminations
- determination of contamination of crops, plants and wells and of contaminations caused by pesticide wastes
- taking samples and analysis of the samples.

The Hungarian Food Safety Office (MEBIH) is responsible of continuous and thorough production control processes in food production chain.

#### ***IV. Ministry of Transport, Telecommunication and Energy***

The responsibility of the minister for determining requirements regarding the transport of dangerous goods, for placing on the market of POP containing products and for the enforcement of these requirements covers some aspects of the domestic regulation of POPs. In the framework of public authority tasks regarding composition and quality of products it falls under his responsibility to enforce the regulation banning to place on market products containing controlled POPs.

It is his task to issue regulation on filling those equipment with environment--friendly substitute oils, from which POP containing oils were removed for destruction (condensers, transformers, hydraulic equipment, etc.) The minister determines - if necessary complements - the list of products falling under obligatory export-import licensing, indicating custom tariff codes, and supervises the process of licensing.

#### *V. Central Statistical Office*

The institution responsible for collecting and handling of statistical data in Hungary is the Central Statistical Office. It collects and publishes those data on production and on activities, which are the basis of calculation of POP emissions.

#### **2.2.3 Relevant international commitments and obligations**

*Why have we to accommodate ourselves to the requirements of the EU Regulation?*

Hungary is committed to comply with the regulations of all the three international POP agreements mentioned earlier and with the POP emission levels assumed by the 2<sup>nd</sup> National Environment Program simultaneously. Although the (national) implementation plan originally aimed at the fulfilling the obligations required by the Stockholm Convention only, in case of such a large-scale similarity in the structure and overlapping in the stipulations of the three agreements it became obvious, that the stipulations of the strictest international document are to be followed. This one is however the EU Regulation of POPs, which not only covers all the stipulations of both the Aarhus Protocol and the Stockholm Convention, but contains some further and/or more strict ones as well.

The EU POP Regulation (EU-R.) entered into force in the Member States by 20. March 2004, the Stockholm Convention entered into force for Hungary by 12<sup>th</sup> of June 2008 .The Aarhus Protocol is in force in Hungary since 6. April 2004.

As it is well known the Aarhus Protocol controls 16, while the Stockholm Convention 12 groups of POP chemicals. It is an other difference, that the Aarhus Protocol deals with long-range atmospheric emissions only, the Stockholm Convention controls all emissions to all spheres of the environment.

The EU Regulation controls the following POP compounds:

- *Pesticides*: Aldrin, HCB (Hexachlorobenzene), Chlordane, Chlordecone, DDT, Dieldrin, Endrin, Heptachlor, HCH (Hexachlorocyclohexane, Lindane is a HCH mixture containing more than 99% of the gamma-isomer), Mirex, Toxaphene.
- *Poisonous chemical compounds*: HBF (Hexabromobiphenyl), PCB (Polychlorinated biphenyls), latter also as unintentionally produced by-products
- *By-products of thermal technological processes*: PAHs ( Polycyclic aromatic hydrocarbons), polychlorinated dibenzo-dioxins (PCDD) and dibenzo-furans (PCDF), Hexachlorobenzene (HCB) and PCBs.

#### **2.2.4 Domestic legislation and regulation of manufactured and unintentionally produced POPs**

In the first period of the approximation of domestic legislation to those of the European Union (1998-2002) most of the stipulations of the Aarhus Protocol became part of the domestic regulation providing thus a convenient framework for the introduction of further regulations regarding POPs. Later a number of new regulations, detailed in the following chapters, prepared the path to take over also the requirements of the Stockholm Convention and of the EU Regulation.

Domestic provisions on the *ban of production and use of controlled POPs* are in compliance with the present and international regulations. Regarding the *reduction of POP emissions* only a few emission limit values (ELVs) are imposed in the European Union. These were all adopted by the domestic legislation. The reduction of POP emissions of industrial processes will be achieved by strict application of Best Available Techniques (BATs).

Latest change regarding the control of POPs was the modification of the EU-R. in 2006. Namely concentration limit values of controlled POP compounds in wastes have been determined in Annex IV of the modified EU-R., which are of determining character for waste management regulations. This modified Regulation of the Council and Parliament (1195/2006 EC) entered into force in member states by 7 August 2006.

One can summarize, the *domestic laws and governmental as well as ministerial decrees are in fully compliance with the stipulations of the Stockholm Convention*, and also with the Aarhus Protocol and of the EU Regulation. With other words:

***As this NIP aims the compliance first of all with the Stockholm Convention, can be stated, that no further regulation is required to fulfil the provisions of this convention in Hungary.***

### **2.2.5. Key approaches and procedures for POPs chemical and pesticide management s**

Production and use of POPs listed in Annex A of SC (and Annex I of the EU-R.) is banned. This situation does not pose any new obligation on Hungary, because domestic legislation and practice are in full compliance. *The withdrawal of licenses of pesticides containing POP active ingredients preceded by many years their banning by legislation*, moreover production and use of several other pesticides not controlled by international agreements was also banned. Necessary measures emerge only with respect to POP containing pesticides imported illegally (smuggled) to the country.

PCB was never produced in the country, however equipment containing imported PCB were widely used: e.g. it was used as dielectric fluid in condensers and transformers and as hydraulic and heat transfer fluid in machineries. PCBs were used as additives increasing the efficiency of pesticides and as softeners in paints, lacquers and inks. Measures regarding PCB containing equipment are presented in Chapter 3.3.4.

The EU R. introduced – compared with the requirements of the AP and of the SC – a new stipulation according to which any product shall not contain any component, which falls under the POP regulations. This problem, including production, placing on the market and use, is discussed in Chapter 2.3 in detail.



### 2.3. *Assessment of the POP issue in Hungary*

#### 2.3.1. **Assessment with respect to Annex A, part I chemicals (POPs pesticides) of SC. Production, use, export and import of POP containing pesticides, existing regulatory framework**

*(Annex I Parts A and B of EU-R)*

##### 2.3.1.1 *General survey, production and quantity of POP containing pesticides used*

Production, placing on the market and use of POP containing pesticides listed in the Annexes referred above is banned, the existing domestic regulations are in compliance with the international agreements.

Earlier there was a significant domestic production of POP containing pesticides. More than 85% of the territory of the country is arable land and more than 75% of this (4,7 million hectares) can be utilized as tillage area. From these data it can be seen how important the use of fertilizers and pesticides in the years of “intensive farming” was.

Two domestic companies produced the major part of pesticides with POP active ingredients, the Budapest Chemical Works and Nitrokémia Industries. Lesser amounts were also imported, mainly from the former German Democratic Republic as well as from the United Kingdom and from (Western) Germany. Domestic production served practically only the home market, no data on exports are available.

The National Plant and Soil Protection Service has rich archives of data comprising the total domestic use of POP containing pesticides covering 50 years. These data were presented in the national POP emission inventory reported earlier in full details. A summary of this pesticide inventory is demonstrated in the following table, presented the sales of POP containing pesticides between 1950 and 2000.

The total quantity of pesticides sold was almost 2,4 million tons, which included 450 thousand tons of POP containing pesticides. This is somewhat less than 20% of the total. The active POP ingredient content of the 450 thousand tons of POP containing pesticides was about 66,5 thousand tons (about 15%). The table shows by individual active POP components and by decades the quantities used and their added-up sums.

*Domestic sales of POP active ingredients of pesticides by decades between 1950 – 2000:*

Active substance	1950-1960	1961-1970	1971-1980	1981-1990	1991-2000	Σ
	(t)	(t)	(t)	(t)	(t)	(t)
DDT	10 128,31	29 347,61	4,35	-	-	39 480,27
HCH	2 555,87	4 399,20	-	-	-	6 955,07
Lindane	2,10	8 787,82	4 314,98	175,65	3,90	13 284,45
Toxaphene (Camphechlor)	153,42	1 595,68	1 807,45	75,20	1,00	3 632,75
Aldrin	0,70	1 893,71	-	-	-	1 894,41
Dieldrin	4,75	259,40	-	-	-	264,15
HCB	0,04	5,17	17,10	-	-	22,31
Chlordane	-	0,10	-	-	-	0,10
2,4,5-T*	0,05	255,05	601,71	68,90	-	925,71
<b>Total</b>	<b>12 845,24</b>	<b>46 543,74</b>	<b>6 745,59</b>	<b>319,75</b>	<b>4,90</b>	<b>66 459,22</b>

\* Not controlled by SC

*The maximum of the sales of pesticides with POP active ingredients was between 1964 and 1971, in this period the annual use was constantly at 30.000 tons or more. In this period also the ratio of POP containing pesticides was the highest among all pesticides, reaching its peak in 1969 with 72%, after that it fell sharply. The table also shows, that the pesticide used in the largest quantity was DDT, followed by Lindan.*

*The withdrawal of POP active ingredients can be summarized as follows:*

The first big wave of withdrawal started in 1965 with a formulated DDT product (Hungária Matador 5% dry powder) and lasted till 1970. Hungary was the first country in the world banning the production, import and use of pesticides containing aldrin, dieldrin, pure HCH and DDT active ingredients.

The second bigger withdrawal wave was in 1991 -1992, when a number of combined products, e.g. Buvinol or pesticides containing 2,4,5-T were banned, noting, that the use of the letter is not yet banned by international agreements.

### *2.3.1.2 Domestic regulation, withdrawal of use licenses*

Several compounds controlled by international POP agreements have never been produced and the use of others has never been licensed in Hungary (e.g. Mirex, Chlordecon). Furthermore our prevailing specific regulation bans the production and use of several other POP active ingredients, which are not controlled by the international POP regulations (e.g. 2,4,5-T, Dicofol).

The comprehensive regulation on placing on the market and licensing the use of active ingredients is the *Decree 89/2004.(V.15.) FVM (MARD)*. This decree bans the use of all active ingredients listed by the international agreements. However domestic regulation on banning or restricting the use of POP containing pesticides were issued long before.

*The domestic practice of withdrawal of licenses preceded regulatory steps*, regulation only followed the actual practice of withdrawals. The last withdrawal occurred in 1999, which effected the Lindan-containing pesticide Lindafor.

PCBs were seldom used as active ingredients of pesticides, nevertheless these are listed in the decree mentioned above as banned chemicals. The total ban on PCBs – harmonizing with EU Directive 76/769/EC – is effected by the Decree 41/2000.(XII.20.) EüM-KöM of the Ministries of Health and of Environment.

For exports and imports EU Regulation 304/2003/EC is valid also for Hungary, its Annexes contain all chemicals to be eliminated.

Summarizing can be stated on the domestic regulation, that - preceding the banning stipulations of the SC or EU-R. -, it has already contained provisions on banning the production and use of the listed pesticides.

### *2.3.1.3 Conclusions*

The former large-scale use of POP containing pesticides leads to the conclusion, that because of their persistence these compounds are yet present in the environment, first of all in soils, and get through the nutrition chain into the human organism. This is proved by examinations of blood, tissue and human milk.

Therefore it is indispensable to find those sites, stores, warehouses, etc., where such obsolete pesticides and residues are “hiding away”, to collect and destruct these wastes in an environment-friendly manner. Such residues may in principle occur also in – possibly illegal – landfills, waste dumps or in contaminated sites, however this assumption was not proved by an assessment of waste deposits accomplished in 2002-2003 with PHARE support and by examinations/controls carried out in the framework of the environmental remediation program.

Although a survey made in the framework of the National Waste Management Plan (2003-2008) approved by Decision 110/2002.(XII.12.) OGY of the Parliament indicate in (some) deposits and in illegal landfills potential POP containing pesticides and packaging materials, PCB and PCT containing wastes, however their quantity is so small, that a specific action would not be justified.

**2.3.2 Assessment with respect to Annex A, part II chemicals of SC (PCB).  
Production, export, import and use of PCBs, PCB containing equipment,  
withdrawal from use, storing and destruction.**

*(Annex I Part A of EU R.)*

*2.3.2.1 Domestic use of PCBs*

PCBs were never produced in Hungary. The use of (imported) PCBs ceased in new equipment practically in 1984, only minor uses were reported in several years after 1984 (1-2 kg). PCBs were replaced by other compounds in the industrial applications.

Formerly, *before 1984, imported PCBs were widely used* as additives to dielectric oils in condensers and transformers, further as heat transfer and hydraulic oils and to a lesser extent as softeners in paints, lacquers and inks.

*2.3.2.2 Prevailing domestic regulation and objectives*

Article 1, paragraph (1) of the EU-R. – in accord with the provisions of the Stockholm Convention - prohibits the production, placing on the market and use of POPs listed in Annex I, whether on their own, in preparations or as constituents of articles. This Annex contains the industrial uses/applications of PCBs, *therefore specific domestic regulation on these applications is not necessary, because EU-R. is in force in Hungary.*

For the further use of PCB containing equipment already in use before the date of entering into force of the Regulation, the EU-R. –in accord with the Stockholm Convention- allows a temporary exemption, provided the requirements of Directive 96/59 EC are fulfilled. This directive was adopted by the Decree 5/2001 (II. 23.) KöM (MEW), future tasks and action plans, which constitute a part of the National Waste Management Plan (2003-2008), too, are determined on the basis of the stipulations of this decree.

The decree prescribes the assessment of the quantity (number) of equipment (condensers, transformers, other equipments) holding more than 5 liter PCB containing oil with a PCB concentration higher than 0,05 vol.%, furthermore assess the quantity (volume) of oil held by each equipment and of the PCB concentration of the oil.

The measurement of the PCB concentration is obligatory, on the one hand in order to ascertain whether the oil, resp. the equipment does or does not contain PCBs, on the other hand to set firm professional and legal basis for their further management, depending on the PCB concentration. According to the decree equipment holding oil with a PCB concentration

higher than 0,05 vol.% are to be dismantled by 31 December 2010 and the owner/operator has to provide for the destruction of the waste oil containing PCB and of the (empty) equipment proper. Equipment with oil containing less than 0,05 vol.% PCB can – if the technical condition of the equipment allows – be used further.

It was expected, that the enforcement of this decree will – almost 20 years after having stopped the use of PCBs in new equipment – lead to a reliable assessment of PCB containing equipment in use and of their PCB content, which is a potential source of danger or damage to the environment and therefore it has to be destructed in an environment-friendly manner.

### 2.3.2.3 *Measures taken so far, results and conclusions*

1. In order to enforce the domestic decree above and to set up a nationwide unified register of PCB containing equipment, the competent department of the MEW requested the Regional Environmental Inspectorates to report in detail by the end of 2004 on the activities of companies/owners/users on their respective territories obliged by this decree. The assessment made by summing up these reports recorded the actual situation in 2003-2004.
2. According to the assessment the Inspectorates registered in 2003 nationwide 1392, in 2004 1171 *transformers*. The quantity of dielectric fluid of the transformers in 2003 was 212 tons, in 2004 159 tons.

The number of *condensers* registered was higher, but have contained less dielectric fluid: in 2003 were 15.103 pieces containing 101 tons of dielectric fluid, in 2004 were 13.594 pieces with 94 tons of fluid. Equipment other than transformers and condensers containing PCBs were hydraulic parts of 20-30 pieces of rather old machines in the mining industry containing lesser amounts of PCBs.

*Thus the total amount of PCB containing oils in 2003 was 313 tons, which decreased in 2004 to 255 tons.* The decrease was an obvious consequence of the fact, that companies/users have started to dismantle and destruct equipment, resp. the fluid filling as ordered by the Decree 5/2001.KöM.

3. The Inspectorates and the owners/users of the equipment assumed that the dielectric oil filling of the equipment registered contains more than 0,05 vol.% PCB. This means that to comply with the decree each and every registered equipment must be dismantled and destructed.
4. The standpoint of the MEW – taking into account experiences of developed industrialized countries – is that the necessary and possible way of destruction of PCB

containing oils in Hungary is their incineration in waste incinerators. Other, chemical waste treatment methods are in respect to the protection of the environment and to economy presently non viable. The capacity of existing domestic incinerators burning hazardous waste is adequate to incinerate the quantity of halogen containing waste referred to above.

*The most important conclusion of the assessment and of the measures taken so far – and at the same time one of the main priorities of the National Implementation Plan – is, that PCB containing oils must be collected and till the end of 2010 destructed in hazardous waste incinerators, furthermore the oil have to be replaced by fluids less contaminating the environment.*

### **2.3.3 Assessment with respect to Annex B chemicals of SC. Production, import, export and use of DDT, its residues, if used in the country**

*(Annex I Part A of EU-R)*

During the last 5-6 decades DDT was the POP compound used in the largest quantities in Hungary (probably in the world as well), the license for its use was withdrawn already in 1966 – among the firsts in the world. Very small quantities were stockpiled in the early nineties for emergency situations, but these were according to records of the Ministry of Health liquidated. The Stockholm Convention allows certain possibilities of exemption for use as chemical intermediate (for the production of dicofol) and for certain health purposes (disease vector control in the case of malaria), however the EU Regulation allows temporary exemption only for the production of dicofol.

The prevailing domestic Decree 89/2000.(V. 5.) FVM (MARD) bans placing on the market and use of dicofol, too, that means, that the *production, placing on the market and use of DDT for any purposes is strictly forbidden in Hungary*. Destruction of possible DDT residues/wastes is presented and discussed in the relevant subchapter.

### **2.3.4 Assessment of releases from unintentional production of Annex C chemicals of the SC. PCDD/PCDF, HCB, PCB and PAH as industrial by-products.**

*(Annex III of the AP, Annex III of the EU-R)*

The international agreements prescribe the reduction of emissions of POPs unintentionally produced as industrial by-products to the environment. The AP controls 3 groups of POPs

(PAH, PCDD/PCDF, HCB), the SC controls also 3 groups but instead of PAH it controls PCB, while the EU-R. controls all the 4 POP groups. The Second National Environment Program (NKP II) prescribes for 2008 to freeze atmospheric releases of POPs at the level of the base year 1999/2000 and this is valid for all the 4 POP groups.

Separate assessments of atmospheric releases, resp. releases to water and soil are presented in the following subchapters.

#### *2.3.2.4 Persistent organic pollutants released to the atmosphere*

##### *a) Introduction, relevant regulations, emission limit values*

POPs may be released to the atmosphere as unintentionally formed by-products of certain industrial, mainly thermal processes. Although the listed POPs released to the atmosphere may be transferred across boundaries to large distances, a part becomes deposited within the boundaries of the country and contaminates soil and (surface) waters. As a consequence POPs released to the atmosphere have to be taken into account also as soil contaminants, however soil contamination is caused mostly by concentrated POP wastes, such as hazardous waste deposits, residues of obsolete pesticides, and substances deposited directly on soil, etc.

The Decree 3/2002.(II. 22.) KÖM on the technical requirements, operational conditions and emission limit values of waste incineration reinforces the emission limit value of atmospheric dioxin releases at 0,1 ng/m<sup>3</sup> of the former decree 11/1991. KTM of the Ministry of Environment and Regional Policy, but at the same time it requires more: annually two measurements of dioxin emissions and the continuous measurement of some other pollutants. This decree is since 1 January 2005 fully in force. Other atmospheric emission limit values for POPs are worldwide not yet decided.

##### *b) POP emitting technologies*

For compiling the domestic POP emission inventory it was a prerequisite to assess the POP emitting technologies and activities. Besides available domestic data information from international literature, first of all studies, calculations and emission factors of the Dutch TNO and of the German BIPRO institutes were used.

Fuels, technologies	PAH	PCB	PCDD/PCDF	HCB	PCP
Lignite	☼	☼	☼	☼	
Brown and black coal	☼	☼	☼	☼	
Fuel wood	☼	☼	☼	☼	
Fuel oils	☼	☼	☼		
Heating oil	☼	☼	☼		
Leaded gasoline	☼	☼	☼	☼	
Unleaded gasoline	☼	☼	☼	☼	
Diesel oil	☼	☼	☼	☼	
Kerosene	☼		☼	☼	
Municipal solid waste incineration	Small	☼	☼	☼	☼
Hazardous waste incineration		☼	☼		
Medical waste incineration		☼	☼		
Sintering		☼	☼	☼	
Coke Production	☼		☼		
Steel SM Production		☼	☼		
Steel BOF Production		☼	☼		
Steel Electro-Arc Production		☼	☼		☼
Foundries		☼	☼		
Secondary copper production		☼	☼	☼	
Primary aluminium production	☼		☼		
Brass production			☼		
Cement production	Small	☼	☼	☼	
Lime production		☼	☼	☼	
Brick production			☼		
Tiles production			☼		
Glass production			☼		
Ceramics production			☼		
Asphalt mixing			☼		
Pulp and paper mills			☼		
1,2-dichloroethane (EDC) production			☼		
Crematoria			☼		
Smoke houses			☼		
Tobacco smoking			☼		
Landfills		☼			

☼ = Sources considered  
 Small = considered, but negligible

**Table 1: Antropogenic sources of atmospheric POP emissions**

In the following paragraph atmospheric POP releases of technologies listed in Table 1 are examined. POP substances shown in Table 1 may released to the atmosphere from technologies listed in this table and by burning of different fuels.

At the time of compiling the POP inventory in 2003, POP emission data based on valid measurements only in few cases (e.g.for waste incineration) were available. Determination of POP emissions of metallurgical activity and of power stations, which constitute the vast



majority of the total, was carried out in the framework of a revision/recalculation of the inventory in 2005-2006.

c) Method of calculation of national POP emissions

It was a peculiarity of the inventory of POP emissions, that in 2003-2004, when the inventory was first compiled, that only very few, actually only one set of measured emission values were available, emission data were calculated – with the exception mentioned above, where emission data of waste incinerators were measured – by multiplying annual activity level data and emission factors taken from international data sources and expert's estimations.

The inventory presented now was corrected on the basis of a number of measurements carried out in 2005-2006 at metallurgical plants and power stations. In cases where measured values were not available at all, emission factors of the EMEP/Corinair Atmospheric Emission Inventory Guidebook were used, i.e. the guidance edited by that organization (UN/ECE), to where Hungary is regularly sending since long reports of emission data.

If no relevant emission factors could be found in this guideline for a given activity, POP emission factors determined on the basis of multiple measurements by the Dutch TNO Institute were used and in case emission factors were missing from that source as well, emission factors of the Dioxin Toolkit (edited by UNEP Chemicals in February) and finally as a last resort expert estimates were used.

Data on the level of activities which are necessary for the calculations were taken from reports, brochures of the Central Statistical Office, from statistics on energy production and consumption, in many cases directly from the companies and from other sources. The annual POP emissions were calculated by multiplying the level of activity with the relevant emission factor.

d) *Quantity of atmospheric POP emissions*

The first inventory of POP emissions was compiled in 2003-2004, where detailed POP emission data for the year 2001 and retrospectively were presented. In order to improve the inventory, as mentioned earlier, measurements funded by the state budget were carried out in 2005-2006 and the results of these measurements constituted the base of corrections of earlier emission data.

For the correction of the inventory also recent guidelines and studies of international organizations on POP emitting activities and emission factors were taken into account (e.g. UNEP Toolkit 2005). The most important was a study commissioned by the EU and carried out by BIPRO, which analysis unintentional POP emissions of the 25 EU countries in a comprehensive manner (BIPRO Final Report, 25 July 2006). This study reflects the ambition of the EU, that - in calculating POP emissions - member countries should take *identical/unified activities* into consideration. The study informs further on the most significant emission sources on a European scale.

Taking into account the information referred to above and following the format proposed by UNEP a *corrected inventory of unintentionally released POP* emissions was calculated, which contains the data of the year 2004 (the last year for which detailed data are available).

*Summary of the results of the 2004 inventory of uPOP releases in Hungary:*

- total atmospheric *PCDD/PCDF* emission on 2004 was about 103 g-TEQ (for comparison and to illustrate proportions, in the EU-25 it was - according to a study commissioned by the EU and referred to earlier - 5200 g-TEQ/a),
- total atmospheric *PAH* emission in 2004 was – taking into account according to the latest international reporting rules the four individual indicator PAH compounds – about 20 tons (EU: > 2000 tons/a),
- total atmospheric PCB emission in 2004 was about 95 kg (EU: > 4000 kg),
- total atmospheric HCB emission in 2004 was 4,9 kg. (EU: >3500 kg)

Comprehensive dioxin/furan emission data of POP emitting sources in 2004 are shown in the next table.

Cat.	Source Categories	Annual dioxin/furan releases in 2004 (g TEQ/a)				
		Air	Water	Land	Product	Residue
1	Waste Incineration	0,890	0,000	0,000	0,000	6,225
2	Ferrous and Non-Ferrous Metal Production	28,461	0,000	0,000	0,000	30,652
3	Heat and Power Generation	21,670	0,000	0,000	0,000	2,015
4	Production of Mineral Products	3,347	0,000	0,000	0,000	0,000
5	Transportation	0,685	0,000	0,000	0,000	0,000
6	Uncontrolled Combustion Processes	37,188	0,000	54,375	0,000	0,000
7	Production of Chemicals and Consumer Goods	0,256	0,269	0,000	0,058	0,000
8	Miscellaneous	0,350	0,000	0,000	0,000	1,216
9	Disposal/Landfill	0,000	0,000	0,000	0,000	0,000
10	Identification of Potential Hot-Spots	10,000				
<b>1-10</b>	<b>Hungary 2004 total</b>	<b>102,847</b>	<b>0,269</b>	<b>54,375</b>	<b>0,058</b>	<b>40,108</b>

Detailed dioxin emission data of the different source categories including activity data and emission factors applied are presented in *Annex 1*.

*Atmospheric HCB, PCB and PAH emissions* of the same source categories in 2004 were similarly calculated and are shown in the next comprehensive table:

Cat.	Source Categories	Annual releases to air in 2004		
		HCB g/a	PCB kg/a	SUM 4PAH t/a
1	Waste Incineration	332,811	1,708	0,029
2	Ferrous and Non-Ferrous Metal Production	3539,672	12,713	4,031
3	Heat and Power Generation	921,227	68,212	12,808
4	Production of Mineral Products	74,034	0,012	0,000
5	Transportation	2,307	12,170	2,521
6	Uncontrolled Combustion Processes	0,000	0,000	0,000
7	Production of Chemicals and Consumer Goods	0,000	0,000	0,000
8	Miscellaneous	0,000	0,000	0,000
9	Disposal/Landfill	0,000	0,000	0,000
10	Identification of Potential Hot-Spots			0,590
<b>1-10</b>	<b>Hungary 2004 total</b>	<b>4870,051</b>	<b>94,814</b>	<b>19,979</b>

The detailed data of unintentional HCB, PCB and PAH emissions to air – including activity data and emission factors applied – are presented in *Annex 2* of the NIP.

e) *Reliability of emission data of the 2003-2004 inventory, reasons for validation in 2005-2006*

The POP emission inventory compiled in 2003-2004 was based on very few measured values, it was therefore reasonable to validate the data by measurements and to correct them if necessary. The reliability of calculated emission data depends on two constituents: accuracy of the activity data and proper selection of the emission factors applied. The selection of the latter was supported by documents of highly experienced foreign institutions, such as for instance the Dutch TNO or UNEP's Toolkit. It is important, that these documents contain usually more than one, often a range of emission factors for a given technology.

In selecting the proper emission factor characteristics of the technology examined and efficiency of optional filtering equipment or other sophisticated APC measures are to be considered. In cases where no measurement data were available, emission factors selected mostly from the UNEP D/F Toolkit were used (Edition February 2005).

A correction of the emission inventory had to take into consideration not only the results of new emission measurements, but also those significant POP emission sources, which are determining character in the EU, however which were not accounted for in the 2003-2004 inventory.

*One can state, that the POP inventory corrected on the basis of measurements carried out in 2005-2006 and containing emissions of activities formerly not taken into account, as presented here, stands the test of international comparison.* In recent years POP inventories of more and more countries became available. The Hungarian data are comparable with POP inventory data of those Central and Eastern European countries, which are of similar size, population and industrial structure, just as with the emission data of the 2006 BIPRO study analyzing POP emissions of 25 EU member states and of the 2005 TNO study, too.

f) *Detailed analysis of POP emissions and technologies, comparison with BATs*

Further on the data of the corrected POP inventory (Annex 1 and 2) will be analyzed and compared with the recommendations of BATs for relevant technologies, the necessary measures will be drawn up on this basis. The draft of POP BAT guidelines was edited by UNEP in 2004, which was confirmed by the May 2005 Conference of the Parties to the Stockholm Convention (COP-1). This document and IPPC BAT documents, guidelines available till now are the basis of analysis of individual POP emissions.

### **Dioxins and furans (PCDD/PCDF or D/F)**

These are the most toxic pollutants. Concentration measurement data of dioxin emissions only of communal and hazardous waste incinerators are available.

An appropriate *analytical background* for dioxin measurements was for a long while missing. Nowadays there are several high resolution mass spectrometers and laboratories operating them in the country available and in recent years with financial and professional support of the MEW. Sampling and analysis are carried out in several cases by laboratories of foreign companies, which is important in respect to comparability and reference. Summing up: *by today domestic capacity for the measurement of dioxin emissions is available.*

The assessment of POP emissions begins with the determination of emission sources. A unified Nomenclature for Reporting (NFR) form was edited by UN/ECE and reports to the international organizations are to be sent since 2003 according to this form.

The atmospheric D/F emission in the EU-25 was somewhat more than 5200 g-TEQ/a according to the BIPRO study (July 2006). The corrected domestic inventory shows up about 103 g-TEQ/a, which is about 2% of the emission of the EU-25 and corresponds roughly to the proportion of Hungary's population and territory in the EU.

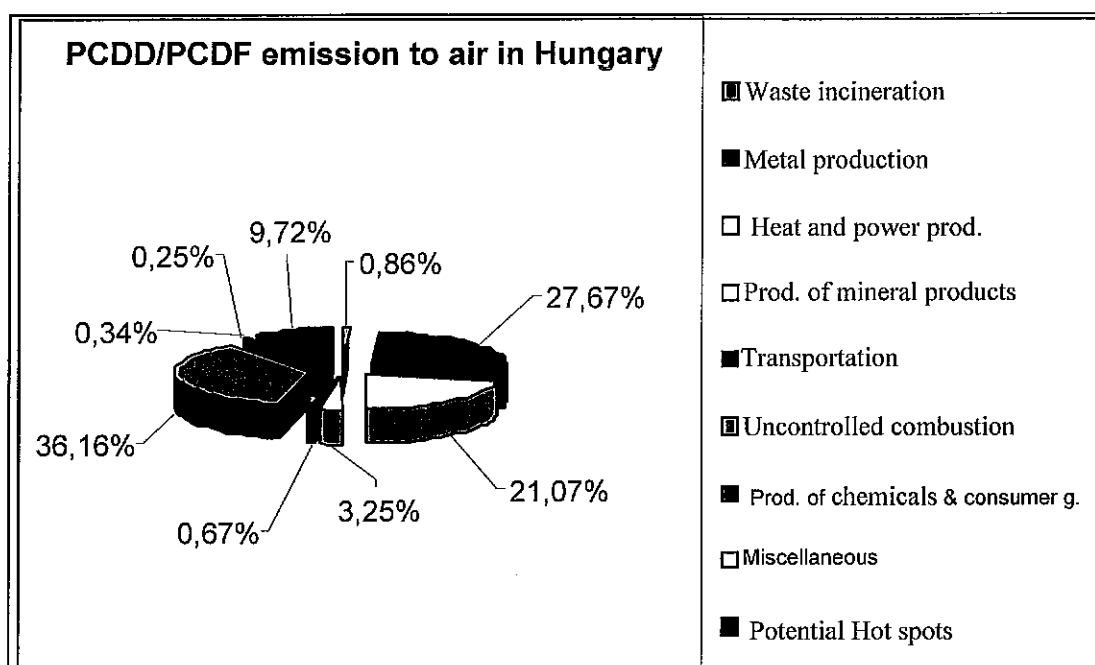
One of the most important outcome of the study is, that it *establishes the atmospheric D/F emitting sources*, which are of determining character in the EU and have to be assessed anyway in compiling the domestic inventory.

The largest atmospheric D/F emitting sources are in the EU-25 the followings:

- household heating
- open-air burning of household and garden waste
- impregnation /conservation of wood
- iron and steel production.

These four activities are responsible in the EU-25 for 75% of the total D/F emission. In correcting of the domestic POP inventory all these sources and their emissions were thoroughly analyzed. The calculated quantity of the D/F emission is product of a multiplication of the activity data (production, consumption) with the selected or calculated emission factor (e.g. of Dioxin Toolkit).

The examination of the individual activities, technologies in Hungary will be carried out based on the detailed D/F inventory presented in Annex 1 and the next figure as follows:



Atmospheric emission of household heating (Cat. 3 Subcat. d-e of D/F inventory of Annex 1) represents the largest part (25%) of the total D/F emission in the EU-25. In Hungary this part is much smaller: 12% of total domestic D/F emission, about 13 g-TEQ/year. This is caused primarily by the fact, that households have changed to natural gas heating, and D/F emission factor of the burning of natural gas is approaching zero. The 13 g-TEQ D/F emission of household heating originates mostly from burning of brown coal/lignite and wood (biomass). Direct measurement of household emissions would be rather cumbersome, emissions were therefore calculated using emission factors published by the Dutch TNO institute in the nineties.

The proportion of atmospheric D/F emissions of open-air burning of household and garden wastes (Cat.6 Subcat. b3) is in the EU-25 rather high (15% of the total), in Hungary is even higher (26% of the total). The emission data were calculated by using emission factors selected from the UNEP D/F Toolkit, while activity data were taken from the database CEPMEIP (2000-2003).

Treatment, conservation, impregnation of wood (Cat. 10 Subcat. e1) contributed with 10 g-TEQ/a to the domestic D/F emission, which represents 10 % of the total (the proportion of this category in the EU-25 is 19%). Treatment with tar, pentachlorophenol or conservation agents yielding dioxin contribute also to D/F emissions.

Emission of iron and steel production (Cat.2 Subcat. a-e) was about 23 g-TEQ/a in Hungary, 22% of the total. The proportion of this category in the EU-25 is 17%. Emission of this

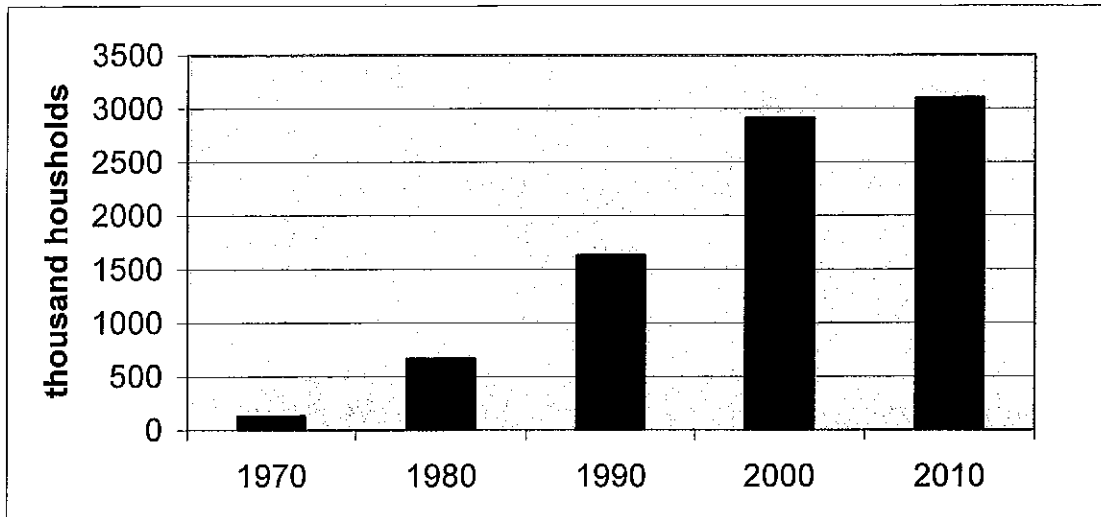
category also include the D/F emissions of collateral technologies such as production of coke and sintering of iron ore.

*Summing up: the most important four D/F emitting activities discussed above are – according to our present knowledge – responsible for appr. 70% of the total domestic D/F emissions (in the EU-25 this proportion is about 75%).*

Other domestic atmospheric D/F emitting activities are the non-ferrous metal production and processing (5%), industrial, agricultural and communal heating (6%), power stations burning coal, oil or biomass (3%), forest and bush fires (10%) and production of mineral products (3,5%). It is worth while to note at the same time, that D/F emissions from incineration of communal and hazardous wastes contributed less than 1% (in the EU-25 accounts 5,5%) to the total in 2004, in spite of the fact that in earlier years it was much higher, and that the emissions from traffic (road, rail, air and water) are also below 1% (in the EU-25 about 1,5% including sea transport). The atmospheric D/F emission of paper and cellulose production is exactly nil, because in 2004 and after neither for bleaching nor for any other technological step were chlorine containing agents used.

#### Analysis of individual D/F emitting activities and comparison with the BATs

In connection with *household heating* it can be stated, that because of widespread use of natural gas compared with earlier years and decades, the use of coal/lignite and oil for household heating has sharply dropped. It is however to be mentioned, that with the change of the subsidy system for natural gas, which has just now started, one can conceive, that a change back from natural gas to solid fuels will occur, the emissions of the latter represent a higher load on the environment. There are no data available yet how this phenomenon will influence the emission of pollutants. The next Figure shows the gradual penetration of natural gas in domestic household heating.



*Number of households connected to natural gas pipelines (1970-2010)*

On the figure it can be seen, that as of today about 3 million households are connected to the net of natural gas pipelines, which means an almost total nationwide coverage. The sharp drop in household use of coal/lignite was caused by a state subsidy system for the introduction of natural gas. About 2100 kt of coal/lignite was used in 1990 for household heating, and only 600 kt in 2000 while the proportion of imported higher quality coal having less detrimental effect to the environment has risen.

It is to be noted that *domestic power stations* are further on using fossil fuels (brown coal, lignite, to a smaller degree oil) and recently also biomass. Because presently there is no (legal) obligation to measure D/F emissions of power stations, it was justified to start (new) D/F emission measurements funded by the state budget in 2005 at power stations.

The results of the measurements are presented in *Annex 3*, according to which extremely low D/F emissions were observed. For sake of safety high(er) emission factor figures of the UNEP D/F Toolkit were used. It resulted an emission value of 3 g-TEQ/year, which amounts to 3% of the total domestic D/F emissions, included the emissions of biomass burning in power stations. The result of measurement at biomass burning resulted less than 0,02 ngTEQ/m<sup>3</sup> (*Annex 3*) which represents the niveau of BAT acc. to the POP-BAT guideline.

Also the Northern Hungarian Environmental Inspectorate checked in its heavy industrial district the D/F emissions of D/F emitting technologies in 2005. The results of measurements are summarized in *Annex 4* which validate that the D/F emission concentration in each case were under 0,1 ngTEQ/m<sup>3</sup>.



*Conclusion: the results of the measurements carried out so far do not justify further measures.* However, the number of D/F measurements so far were very limited, therefore more measurements are needed in the future in order to put the selection of proper emission factors on a solid base of multiple measurements. Depending on the results of further measurements can it be decided whether measures are necessary or not to update the processes and/or filtering techniques applied.

It has to be noted, that the recent additional measurements of the POP emissions of domestic power plants carried out in May-June 2007 confirmed the previous conclusion. I.e. no further measurement of the POP emissions of the big power stations are necessary due to its low POP releases. The current results are presented in *Annex 8*.

The best available technique (BAT) for flue gas cleaning presumes besides fabric filters and electrostatic dust precipitation the use of semi-dry or wet flue gas cleaning equipment. The main reason of the environmentally positive result of the measurements is, that investments executed – for instance in the framework of a flue gas desulphurization program - in the last years in order to reduce the emission of “traditional” air pollutants (SO<sub>2</sub>, NO<sub>x</sub>, HCl, dust, etc.) contributed advantageously to the reduction of POP emissions as well.

*The largest item of the D/F inventory is the open-air burning of household and garden wastes (26%).* The competence of regulation of this activity lies in Hungary with the communal authorities, which means practically, that conditions of burning of garden wastes are prescribed by decrees of (local) communal authorities. It is obvious that whenever possible aerobic composting is the proper way to avoid D/F emissions. To solve this problem in a satisfactory manner it is justified to create relevant state level legislation.

*Treatment, conservation and impregnation of wood* represents in Hungary 10% of the total D/F emission. D/F emissions of impregnated wood may originate partly from the evaporation of the treating agent and partly from the burning of the treated wood becoming waste after its use. Treated wood becoming waste is classified as hazardous waste (code number EWC17/02/04, European waste list), which means that it must be destructed exclusively by incineration in hazardous waste incinerators. The best available technique is to avoid the use of tar, pentachlorophenol and other treating agents yielding dioxin.

*The second largest D/F emitting source category in Hungary is iron and steel production* with collateral production of coke and sintering of iron ore, which represents 22% of the total. The emission of iron ore sintering was 5,3 g-TEQ/year, of coke production nearly 2 g-TEQ/year, of iron and steel production nearly 3 g-TEQ/year, while the largest quantity (13,5 g-

TEQ/year) was emitted by a number of non-controlled, out-of-date smelting cupola furnaces operating without fabric filters or other separating equipment.

Looking for *best available techniques* one can find both in BAT guidelines condensed and translated into Hungarian and in the more detailed English reference BATs D/F and other POP emission parameters of production and casting of iron, sintering, coke production, steel production (BOF, electric furnace) and casting. A separate chapter deals with the presentation of domestic situation in the already mentioned condensed guideline in Hungarian compiled by the Technical Development Office of the Hungarian Iron and Steel Association. In comparing different activities with BATs it is worth while to consider also the so-called POP-BATs, which were edited in December 2004 as drafts by UNEP („Guidelines on BATs and BEPs relevant to Article 5 and Annex C of the Stockholm Convention on POPs”). The measures of NIP are based on these documents.

*The D/F emissions of non-ferrous metal production and processing* constitute nowadays only 5 % of total atmospheric D/F emission. The primary reason is that the volume of this activity becomes less and less, non-ferrous metals are mostly imported. Meanwhile also secondary copper processing ceased in the country, so aluminum production and processing remained only as substantial D/F emitting technology. In the case of primary aluminum production no further measures are necessary, because the last primary aluminum production plant in Inota was closed in 2004. On the other hand there is secondary aluminum processing in Hungary and based on BAT guidelines measures are to be taken to decrease D/F emissions, first of all to install waste aluminum smelting furnaces with filtering equipment (fabric filter, AC filter).

*The D/F emissions of industrial, agricultural and communal heating* constitute about 6% of the total. These are mostly activities of enterprises where there are possibilities of further emission reductions. At existing heating equipment it is – because of the deadline of obligatory application of BATs (October 2007) – expected that developments to reduce emissions will be carried out. Majority of these developments is the use of up-to-date burners and filters, which are listed in the detailed action plan.

*Accidental forest and bush fires* represent 10 %, that is quite a large proportion of the total D/F emission. The tasks of the authorities regarding these fires are regulated, no further measures are necessary.

*The D/F emissions of communal, hazardous and medical waste incinerators* constituted in former years, decades a much higher part than nowadays, however in 2004 their proportion was less, than 1%.

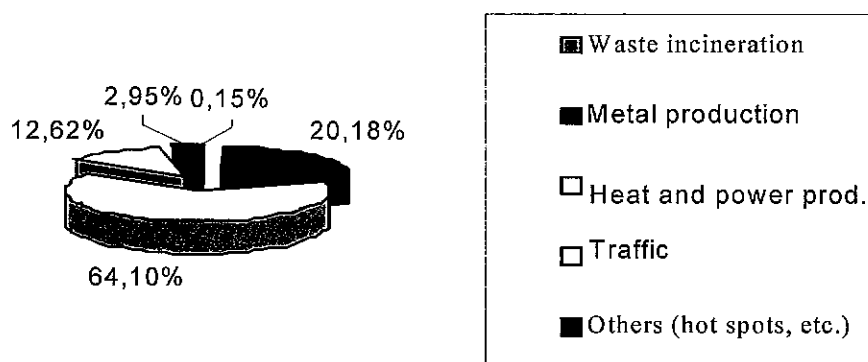
This rather large-scale reduction of emissions was caused by the fact that the regulation regarding the emissions of waste incineration, valid since 1991, prescribes an emission limit value of 0,1 ng-TEQ/m<sup>3</sup> for D/F emissions, further the obligation of annual measurements and of reporting the results to the Environmental Inspectorate. These requirements became even more strict by Decree 3/2002. MEW, which prescribes two measurements annually. Because a derogation granted by the EU expired by 30 June 2005, for all those incinerators which at the time of accession to the EU did not comply with the requirements in force, from that date all the requirements of the decree mentioned above are minimum requirements for all licensed domestic waste incinerators.

In order to comply with these strict regulations the relevant waste incinerators executed substantial investments for the protection of the environment and added flue gas cleaning equipment to their already existing fabric filters/precipitators. Several incinerator enterprises were not able to upgrade their equipment and discontinued their activity. That means, that all licensed domestic waste incinerators comply with the D/F emission limit value.

*Cement kiln co-incinerators* must – according to the decree referred to above – also report regular data of measurements. To decrease D/F emission of cement factories and co-incineration and to compare with up-to-date processes there are reference BATs available.

**Polycyclic aromatic hydrocarbons (PAHs)** are frequent by-products of industrial thermal technologies. After the introduction of NFR codes atmospheric PAH emissions are to be characterized by the emissions data of four distinct, well-defined compounds. According to the emission data presented in *Annex 2*, the total atmospheric emission of the four analyzed PAH compounds was 20 tons in Hungary. According to the BIPRO study mentioned earlier in the EU-25 it was 2000 tons, i. e. Hungary was responsible for 1% of the total.

**PAH emissions to air in Hungary**



Examining activities causing PAH emissions one can observe, that the production of heat and electric energy, within that the *household burning of solid fossil fuels* contribute to the greatest extent to the emissions both in the EU-25 and in Hungary, where it constitutes more than half of the total PAH emission (see previous figure).

All this in spite the fact, that in Hungary most of the households are connected to the natural gas pipeline net , and by burning natural gas practically no PAHs are formed. We have to take into account the possibility, that with the decreasing subsidy of natural gas price for households the use of solid fossil fuels (first of all wood and lignite) will increase. As a consequence – inter alia – the emissions of PAHs will increase.

*PAH emissions from aluminum production* represent also a substantial item of the PAH inventory in 2004, but as a consequence of decreasing domestic production a further reduction of emission is expected. The remaining secondary aluminum processing plants are obliged to apply best available techniques from October 2007, which signify new challenges (investments for the protection of the environment) to this branch of industry.

*At last PAH emissions from road traffic*, first of all from vehicles equipped with diesel engines are significant. All motor gasoline sold on the market is lead-free, no further measures are here necessary to decrease emissions. Chlorinated and/or brominated additives for diesel fuel are already totally banned in the country.

It will be necessary to apply specific particle filters for diesel engines, because these are decreasing PAH emissions to a large extent. This is however a costly intervention and their introduction is conceivable only on EU level. The EU has started with the preparation of an appropriate regulation on the application of engines complying with EURO-5 requirements.

*Calculated emission values must be controlled by measurements.* In such a case not only emissions of the four indicator PAH compounds are measured, but also of any PAH being formed, and mostly not only PAHs, but other POPs also. Moreover if a technology is getting to be controlled, samples for analysis are taken not only from the air, but also from technological residues and from waste water.

In the course of the measurements it has to be taken in consideration that the Decree 14/2001. KÖM-FVM-EüM determines for the *PAH compound 3,4 benz(a)piren* an extremely strict atmospheric emission limit value (0,1 mg/m<sup>3</sup>), the reason of which is the carcinogen nature of this PAH compound.

*PAH emissions of the household sector* arising from burning solid fossil fuels will expectedly increase, which is caused by the change (decrease or termination) of subsidy for natural gas.

The rate of increase of emissions is not yet known, however it is justified to introduce appropriate regulation.

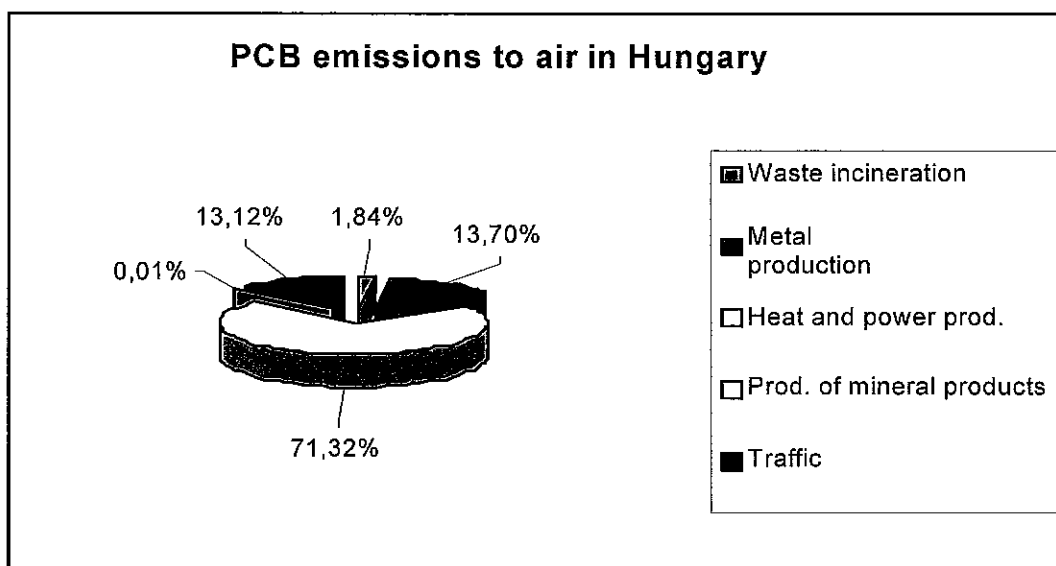
*D/F emissions of metallurgy are often accompanied by collateral PAH emissions* as well, thus the reference BATs mentioned previously serve at the same time the reduction of PAH emissions also.

Among the domestic condensed reference BATs in Hungarian one can find those for the production of non-ferrous metals, which describe in detail *up-to-date processes of aluminium production* and achievable emission levels. One has to be careful to avoid at loading/filling to get oil, plastics or chlorine compounds into the technology, furthermore to secure proper conditions for combustion in the furnace, to minimize the quantity of unburned hydrocarbons. Separation of POPs can be carried out by active carbon adsorption, fabric filters or afterburning.

#### Atmospheric emissions of polychlorinated biphenyl (PCB)

PCBs were not produced in Hungary, but were used as dielectric fluid in condensers and transformers and as hydraulic fluid. PCBs get however into the atmosphere not from these applications and intentionally, but as (unintentional) by-products of different burning and thermal industrial processes, often together with D/F emissions.

Domestic PCB emissions in 2004 was according to the inventory presented in *Annex 2* about 95 kg, while in the EU-25 it was according to the BIPRO study about 5000 kg, Hungary's contribution was about 2%.



From the inventory of Annex 2 and the previous Figure can be seen, that the primary source of the Hungarian atmospheric PCB emissions was –similarly to the EU-25 – the generation of heat and power (electricity), within this sector the emission of power stations, which was caused in first line by burning lignite, in second line brown coal. These account for more than half of domestic PCB emissions. Industrial brown coal burning represents 8-9 %, while household heating, burning biomass (wood) only 4 %. The latter may however increase due to the reduction of the subsidy for household use of natural gas.

Another substantial atmospheric PCB emission source is the production of iron and steel industry (BOF converter process) and collateral sintering of iron ore (13 %), furthermore road traffic (13 %).

Before analyzing BAT recommendations it has to be taken into account, that the drastic decrease of PCB emissions originating from household heating in the last decades was caused by switching to natural gas from solid fossil fuels and oil, thereby PCB emissions originating from the latter decreased.

*The high proportion of emissions released power stations* justifies the measurement of PCB emissions of power stations firing lignite, brown coal and biomass. For the time being there is no ELV established in the EU by legal regulation for PCB emissions.

In the course of a series of emission measurements carried out in 2005 one-one measurement was made at the power stations Vértés Power Plant (brown coal), Borsod Power Plant (biomass) and Bakony Power Plant (biomass). These showed very low PCB emissions.

Therefore to be on the safe side much higher emission factors of TNO were used to calculate the emissions presented in the PCB inventory. At the same *time further measurements are needed*, because the results of only one-one measurement at each location do not justify the change of emission factors.

There are *reference BATs available for large combustion plants* since November 2004, and also the *POP BAT Guidelines* since December 2004. Regarding the quantity of PCB emissions of power stations further information can be collected by continuing measurements. Recommendations of BATs suggest determination ELVs for PCB emissions (on EU and member state level), furnishing of flue gas cleaning installations and for biomass fuelled power stations a pre –selection of the fuel.

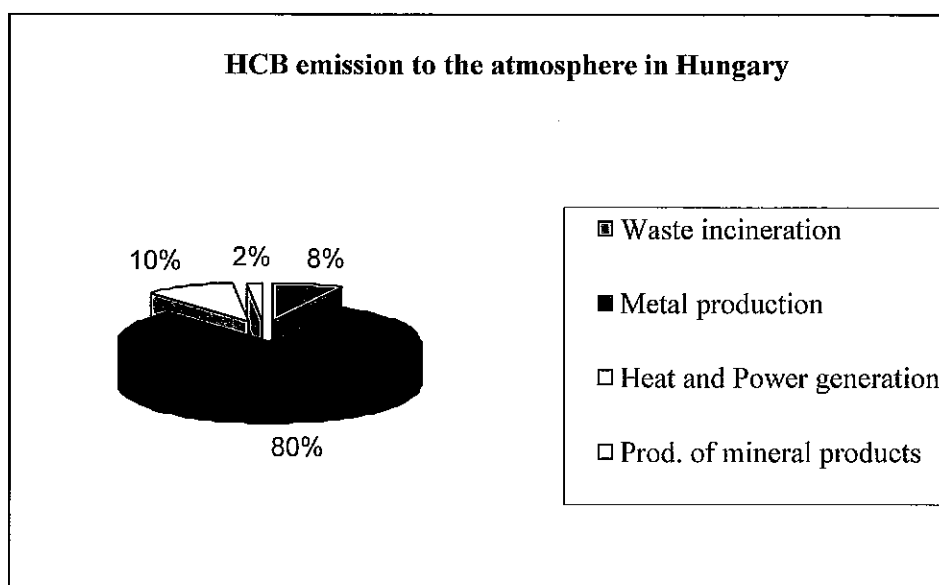
*PCB emissions of metallurgical technologies*, including sintering of iron ore, represent a substantial quantity. Measurements of emissions have to be continued also in this field, the relevant reference BATs are identical with those mentioned at D/F emissions of metallurgical processes.

To decrease PCB emissions from traffic the same measures are necessary as to decrease PAH emissions of road traffic.

### Atmospheric emissions of hexachlorobenzene (HCB)

HCBs are among the undesirable persistent by-products of thermal industrial processes. According to Annex 2 domestic atmospheric emission of HCBs in 2004 was almost 5 kg. The BIPRO study estimates about 2600 kg in the EU-25, thus the Hungarian contribution to the European HCB emission was extremely small.

At the same time the reliability of both European and domestic data is rather uncertain, therefore measurements of HCB emissions is of high priority. It is typical for the uncertainty on the reliability of the atmospheric HCB emissions, that according to the BIPRO study the largest HCB emitting activity in Europe was the use of HCB containing pesticides. This is obviously an intentional use, where HCB may be released into the atmosphere at dispersing the pesticide and may be transported to long distances by winds, and this is the reason why this compound came under the power of the Geneva Convention. In Hungary the use of HCB containing pesticides is long since forbidden, the domestic POP inventory of 2004 calculates no HCB emission originating from pesticide use (see Annex 2 and next figure).



*Production of iron and steel and processing of non-ferrous metals* are the largest domestic HCB emitting sources, which represents 80 % the total in 2004. Mainly HCB formed during steel production in electric arc furnaces (DAM, Diósgyőr) and the BOF converter processes (Dunaújváros) are under investigation. Though the EU Regulation 166/2006/EC (e-PRTR)

prescribes the reporting of HCB emissions originating from these metallurgical technologies, however ELVs were not yet established by the EU.

*Reduction of HCB emissions formed during secondary copper processing* has lost its reason, because the activity of the only processing plant in the country (Csepeli Fémmű) will cease in 2007.

*HCB emission originating from incineration of communal and of hazardous waste* may be according to professional literature quite substantial, therefore the measurements plan includes the measurement of HCB emission of the communal waste incinerator of the capital (Budapesti Hulladékhasznosító Mű), although there is yet no ELV established by the EU.

*The substantial decrease of HCB emissions originating from household burning of fossil fuels* was caused mainly by changes of the fuel structure as mentioned earlier connected with the widespread use of natural gas.

*The relevant BATs* recommend the analysis of HCB contents of flying ashes and dust formed in metallurgical and waste incinerating technologies and the reduction of emissions by installing up-to-date APC systems, filtering/separating equipment. The municipal solid waste incinerator was in the course of a reconstruction accomplished in 2002-2005 furnished with such system.

*g.) Evaluation of atmospheric POP emissions of by-products for drafting measures of NIP*

Reduction of unintentional atmospheric POP emissions of industrial activities and preparation of a national action plan to reduce these emissions is prescribed by all international POP agreements, which are in force also in Hungary. These orders are detailed by Article 6 of the EU Regulation and by Article 5 of the Stockholm Convention, but *the most detailed regulation on the transboundary atmospheric POP emissions is contained by the Aarhus Protocol*, which is in force for Hungary since 6 April 2004, therefore the requirements regarding unintentional POP emissions are evaluated below on the basis of the Aarhus Protocol:

According to Article 3, paragraph 5(a) of the AP total atmospheric emissions of POPs listed in its Annex III must be by the introduction of effective measures reduced compared to a reference year taking into account deadlines and means (application of BATs) listed in Annex VI. It was free to select any year between 1985 and 1995 as reference year, we selected 1985,



when domestic atmospheric POP emissions were on their highest level compared to later years.

*The reduction of POP emissions of by-products can be achieved by fulfilling emission limit values and/or by application of best available techniques.*

Dates of introduction of technical measures are laid down in Annex VI of the Aarhus Protocol. According to this *for activities bound to IPPC licence, the best available techniques (BATs) must be applied.*

*Basic element of the Hungarian legislation is, that the Gov. Regulation 21/2001 obligatory prescribes the application of BATs from 31. October 2007 at each activities. Due to lack of ELVs for a lot of technologies, this will be the main tool to achieve reduction of POP emission of by-products.*

There is one important source category where ELV is available: the provision of the Decree 3/2002.(II. 22) K6M (MEW) *establishes an ELV of 0,1 ng-TEQ/m<sup>3</sup> for D/F emissions of communal, hazardous and medical waste incineration and for co-incineration.* This ELV was as an obligation of an earlier decree since 1991, which urged incinerating companies in the nineties to decide, whether they can comply with this ELV. It involved in most cases substantial investments, or they have to discontinue their activity. This was the main reason that D/F emissions of waste incineration nowadays represent less than 1 % of the total.

During the evaluation of the measurements in 2005 has been obvious, that few information is available for the analysis of the metallurgical processes. Therefore has been decided that additional measurements of their POP emissions should be carried out in 2006 in order to draft the necessary measures for the reduction of emissions. *The results of measurements of atmospheric POP emissions of metallurgical processes in 2006 is shown in Annex 5. Based on the results of 1-1 measurements there is no need for urgent interaction, however more measurement results should be produced on the emission concentration of these technologies in order to have more reliable data on the POP emissions of the metallurgy.*

On the field of controlling POP emissions substantial progress is expected from *the EU Regulation 166/2006/EC (the so-called e-PRTR) entered into force in 2006.* In order to set up a European contaminant/waste register, it prescribes an obligation of reporting for the operators of certain activities and to operators of activities having higher production threshold and emissions, than prescribed for the relevant activity. The list of activities contains POP emitting technologies and the list of contaminants include all the controlled POP substances.

It is important, that this Regulation does not establish ELVs, consequently does not require obligatory measurements. *It obliges operators only report to the competent authority (Environmental Inspectorate) point-like or diffuse emissions originating from activities falling under the scope of the regulation into air, waters or soil, let the data be calculated, estimated or measured. Preparation of disposition of execution of this Regulation (reporting forms, filling-in guidelines, etc.) is under way.*

#### *2.3.2.5 POPs getting to water, soil and waste/residue from industrial by-products*

##### *a.) Object, domestic and international results*

Dioxins/furans, PAHs, PCBs and HCBs may as undesirable by-products of certain industrial technologies get beside the atmosphere also into waters, soil and waste/residue. The domestic and international regulations are mostly of “immission” character, relatively few regulations concerning this specific field contain technological POP ELVs. Recently however this situation began to change. In the next (sub)chapter, presenting the regulatory background (paragraph b.) this change will be explained. At the same place the preparation of regular reporting related to the protection of quality of surface waters will be presented, which will supply point-sources data on the quantity of POP pollutants getting into waters.

One purpose of measurement of domestic emission is the determination of *POP concentration of wastes and waste waters* originating from different industrial technologies. The next step is to compare the data obtained to the established limit values (in case if there are such established limit values) or with POP emission levels achievable by application of relevant BATs. Hereupon appropriate measures based on the comparison can be taken.

In the international literature only *few data are available on the concentration of D/F getting into waste* as undesirable by-products of certain technologies, this issue became regulated only in 2006 in Annexes IV and V of the EU R.

The Dioxin Toolkit edited by UNEP is rendering help to the calculation of dioxin released not only to the atmosphere, but to other elements of the environment. The D/F released to residue or waste water is calculated by multiplying the quantity data of the activity by the appropriately selected emission factor of the Toolkit. The results are presented in *Annex 1*. According to it:

*Domestic dioxin contents of technological residues* calculated by this method in 2004 amounted to 40 gTEQ/year. From Annex 1 it can also be seen, that the quantity getting into

waste water was very small (0,3 gTEQ/year), while as a consequence of open-air burning quite a *substantial quantity was released to the soil* (about 54 gTEQ/year). About 80 % of the POP containing residues originated from iron and other metallurgical technologies, the rest was mostly solid by-product of waste incineration. These residues were disposed in hazardous waste deposits.

*Based on the previous analysis of the POP emissions calculated, it was reasonable to carry out measurements in order to have real data on the domestic situation.* The budget funds separated for measurement of POPs getting to wastes/residues and waste waters in 2005 were sufficient to cover the costs of one-one measurement at power stations, waste incinerators and two metallurgical plants of Dunaferr Co. Ltd, altogether at 12 sites. Detailed data of the measurements are presented in *Annex 6.* and its evaluation in point c.) of this subchapter.

From these measurements however one can not draw well-founded conclusions. In order to achieve internationally acceptable trustworthy results, the measurements have to be repeated on the same sites at least twice.

*On dioxin emissions getting into technological waste waters there are since 2003 results of measurements available, because according to Decree 3/2002. KöM (MEW) for those incinerators where the cleaning of flue gas yielding waste water it is obligatory to report the D/F emissions.* The measurements accomplished hitherto prove that the waste incinerators are able to comply with the emission limit value of 0,3 ng/l in waste waters.

*Measurements carried out hitherto on POP contamination of soil and waters were mainly of "immission" character.* Based on these measurements one can state, that the data cover mostly contaminations caused by several PAHs and PCB. On the condition/ quality of water, national and international (frontier waters) water quality databases are available, on POP contamination of soils the Soil Information Monitoring System (TIM) provides data.

*The results of POP measurements of waters and soils according to data of the 2003 POP inventory have – with few exceptions – shown contamination levels below limit values.* The measurements covered not only the four POP groups discussed in this chapter, but also pesticides containing controlled POPs. The concentration of the latter was below limit value as well. This is not surprising, because most of these pesticides, resp. their active ingredients are banned in Hungary since decades.

At the same time it is obvious, that *efficient POP emission reduction measures can and must be taken at the emitting sources* and that is why the examination and measurements of POP emitting technologies are important.

*b.) Regulatory background*

In regard to regulation of quality of surface and ground-waters the most important rules are the EU Water Framework Directive 60/2000 EC (X. 23.) and its daughter directives of the EU, which were adopted during the last years. Annex 10 of this Directive (and then Decision 2455/2001/EC modifying it) lists 33 hazardous contaminants of priority list, a number among them is an already controlled POP or will be controlled in the near future.

Basic elements of the domestic regulation on the protection of water quality are the following:

- Governmental Decree 219/2004.(VII. 21.) Korm. on *the protection of ground waters* prohibits the direct introduction of so-called risk substances into sewers and also the indirect introduction in particularly sensitive water quality protection areas, in other areas it is subject to special permit. Emitters are obliged to report to the Registration System of Ground Waters and Soil (FAVI).
- Governmental Decree 220/2004. (VII. 21.) Korm. on the protection of quality of surface waters represents a substantial change compared to former regulation because it is based on ELVs of waste waters, these limit values are however based on on reference BATs, resp. on contaminant emissions of the connected waste water treatment processes. The Decree enumerates and controls substances belonging to priority lists I and II of hazardous compounds (and groups of compounds). These lists contain a number of POPs. Release and the introduction of several POPs to sewers is absolutely prohibited (noting that the production and use of those POPs is also prohibited).
- Ministerial Decree 28/2004.(XII. 25.) KvVM (MEW) on the enforcement of the Governmental Decree mentioned above establishes technological emission limit values of water contaminants. Among the 37 technologies controlled by ELVs only two have POP ELVs, namely coking (limit values for PAHs) and non-ferrous metal production (limit values for HCB). That is why it is so important to apply current BATs, which demonstrate the achievable highest technological level.

- Ministerial Decree 3/2002. KÖM on technological ELVs of waste incineration sets the D/F emission limit values of waste waters originating from flue gas cleaning of waste incineration at 0,3 ng/l mass concentration.

The purpose of these decrees is to reduce the concentration of pollutants already at the source of emission. At the same time they serve as a basis for data reporting related to water quality protection of surface waters, namely to the application of forms to be filled in for baseline reporting (VAL) and for annual reporting (VÉL). According to Decree 28/2004. KvVM (MEW) those emitters are obliged to data reporting and/or self-control, whose emitted waste water flow is higher than 15 m<sup>3</sup>/day or are emitting hazardous substances.

*POP contamination levels of soils /geological media are restricted and/or controlled by the following regulations, monitoring systems and national programs:*

The legal background of the operation and long-time maintenance of the *Soil Information Monitoring system (TIM)* is the law LV. (1994) on arable land. It provides possible data of immission character (every 4-7 years, depending on financial sources available) for agricultural purposes. Examination of industrial sites and polluting sources is beyond the scope of this system.

*Communal solid wastes, illegal and abandoned wastes* are potential sources of POP contamination of soil. These, including their recultivation are dealt with by *the National Waste Management Plan (OHT)*, approved by Decision 110/2002. (XII.12.) OGY of the Parliament.

*Assessment and remedy of contaminated and potentially contaminated sites* is task of the National Environment Remediation Program (OKKT). The regulation on the enforcement of this program is Governmental Decree 219/2004.(VII. 21.) Korm.

Preparations are in progress for a *new soil protection strategy of the EU*, however these do not include proposed measures on POPs. This strategy is going to be discussed in the working group on contaminations, which indicates, that restriction of POP emissions and contaminations caused by POPs are dealt with in the EU as two separate issues.

*The concentration range of D/F and of other POPs in residues (sludge, flying ashes) originating from different industrial technologies belonging under the force of waste management regulations* are contained in Annexes IV and V of EU Regulation. This range is in the case of the majority of controlled POPs between 50 mg/kg and 5000 mg/kg, except

dioxins where the range is between 15 microgram/kg and 5 mg/kg and PCBs, where the allowable highest concentration is 50 mg/kg. Should POPs occur in higher concentration than shown above, the residue must not be disposed on hazardous waste deposits, the residues must be destructed, which means in most cases incineration.

*c.) Measurements, evaluation of the results, possible measures*

The chapter of the POP inventory dealing with the *quality of surface and ground waters*, based on data of water quality monitoring and of latest POP contamination measurements of immission character, states that it is *necessary to assess nation-wide the determining POP contaminants in surface and ground waters*. Because this would need considerable financial sources from the (state) budget, the recent decrease of financial possibilities it had to be postponed to future measures.

The few emission measurements on the water quality made so far did not indicate any major POP emission, however further measurements are necessary at those polluting sources where or in the vicinity contamination levels higher than limit values were observed.

*It is expedient to verify the POP concentration (D/F, PAH, HCB, PCB) of waste waters and residues of industrial technologies by measurements*, which might have substantial POP emissions. In case of the majority of technologies, where no ELVs established by regulations exist, the measurements are to be financed by the budget. After that the results of the measurements are to be compared to the emission parameters achievable by BATs and, if necessary, updating of the technologies and/or of the filtering equipment has to be initiated taking into account the regulations pertaining to the application of BATs.

The measurement of POP content of technological residues and waste waters *of the following technologies are to be carried out*, which yield according to the D/F inventory presented in *Annex 1* substantial emissions:

- Waste incineration
- Metallurgical technologies
- Power stations fired by coal and biomass.

In line with these principles the Scientific Research Institute of Water Management (VITUKI) on assignment of the MEW carried out in 2005 *the first measurements to determine the POP content of residues of high-temperature technologies*. The results are summarized in *Annex 6*. Emissions of all the four POPs discussed in this chapter were measured. The plan of measurement contained – because of limited financial resources – at 12 sites only 1-1

measurement of the most important controls in waste water, sludge residue in the boiler, flying ashes from the cyclone dust separators and precipitated dust from the electrostatic filter of the desulphurizer.

*Results of the first series of measurements were surprising*, because the POP content of the residues was generally by several order of magnitude smaller than the lower limit values put down in Annex IV of the EU Regulation, the lower limit was not reached in any case. Before coming to the conclusion related to the POP content of residues of the high-temperature technologies (and the effectiveness of their APC), that any further measures are in the country necessary, the measurements should be repeated at least twice, because based on only 1-1 measurements no far-reaching conclusions shall be drawn.

*Appropriate measures* have to be decided on the common analysis of industrial technologies, results of domestic measurements and foreign assessments. These measures might be:

- Establishment of ELVs in cases where no such limit values exist and it seems to be reasonable to have ones
- Application of APC systems, separation equipment, flue gas cleaning, etc. according to BATs and BEPs of individual technologies
- Training of environment inspectors for a better understanding of the POP regulatory background and for becoming (better) acquainted with POP BATs.

### **2.3.5 Information on the state of knowledge on stockpiles. Identification, collection and destruction of POP containing stocks and wastes, contaminated sites, remediation.**

(SC Art.6, EU-R Art.7, Annex IV)

#### *2.3.5.1 Regulatory background, objective*

The Articles and Annex referred to above under the title of this chapter command

- for the assessment, identification, collection and interim storing of wastes containing controlled POPs or POP containing products becoming waste (e.g pesticides with expired guarantee) the elaboration of strategies.
- the destruction of these stockpiles in an environmentally friendly manner, and
- prohibit any reuse, re-utilization.

The strategy referred to above is among the most important tasks also of the National Waste Management Plan (OHT, 2003-2008).

*Because many of the POP compounds controlled by international agreements are active ingredients of pesticides one can suppose, that there are abandoned, hidden, buried stocks in the country. It is therefore of great importance that decisions on destruction of abandoned stocks and on planning of the necessary waste incineration capacity should be based on reliable data.*

*For collection and destruction of packaging material contaminated with pesticides the Partnership for Public Use CSEBER has according to Decree 103/2003. (IX. 11.) FVM (MARD) established a system running successfully since September 2003. The next task is to collect and to destruct unidentified – potentially POP containing – pesticide residues. This action will serve at the same time the execution of the National Waste Management Plan.*

Exact identification of POP containing wastes is impede by the fact, that the chemical analysis of POP content is very expensive. It is also to be taken into account, that the probability of detecting controlled POPs in waste pesticides is low, because their use was prohibited in the country decades ago. Therefore the collection and destruction of pesticide residues must be performed efficiently.

It would be not worth while to spend much energy, money and time on their identification while these residues – either containing POPs or not – are counted among hazardous wastes and must according to the relevant regulations in any case be destructed.

In our waste registry system the wastes produced are according to Decree 16/2001.(VII. 18.) KöM identified by EWC codes which do not refer to possible POP content of pesticide residues. Therefore *unidentified pesticide residues are assumed as potentially POP containing ones and their common destruction is planned.*

#### *2.3.5.2 Assessment and handling of pesticide wastes*

##### *Background*

According to the data of the POP inventory a substantial part of pesticides used between 1950 and 2000 was POP containing preparation as it was presented in subchapter 2.3.1.1. During this 50 years about 20 % (446.881 tons) of the total quantity of pesticides used was POP containing ones. The most characteristic period of their use lasted from 1950 to 1975. For instance in 1965 the use of pesticides having POP active ingredients was more than 37.000 tons, in 1969 it accounted for 72 % of the total use.



After the ban of POP active ingredients the high ratio of the POP content decreased very rapidly. However, based on the huge historical amount of the POP-pesticides can be assessed that some part of their residues in the country might be hidden and contaminate the environment. Consequently, their collection and disposal are of high importance.

*The Ministry of Agriculture and Rural Development (MARD) and its legal predecessors have for the collection and destruction of POP containing pesticides with expired guarantee already at the end of the sixties and at beginning of the eighties organized several actions.* In spite of these actions in storehouses of collective and/or state farms liquidated in the nineties there are prohibited or non identified pesticides or preparations with expired guarantee, which may contain POPs. The problem of these pesticide wastes is for long since unsolved in the country and represents a continuous health and environmental hazard. That is the reason why the waste pesticides and contaminated packaging material constitute one of the distinguished programs of the National Waste Management Plan. Tasks to be performed in the framework of this program are:

1. Collection of *waste pesticide packaging material* produced continuously from the end user of the pesticide is - with asserting the responsibility of the manufacturer – practically solved. The Partnership for Public Use CSEBER undertook also the nationwide collection and destruction of packaging material contaminated with pesticides, in this particular case with POPs.
2. Residues, stockpiles left over from the past, obsolete pesticides withdrawn from the market, non-identifiable and potentially POP containing pesticide wastes represent as time-bombs incalculable environmental hazard. Because a major part of these stockpiles is to be found in storehouses not operating any more or abandoned by unknown operators and/or owners, the *collection and destruction needs at least partial participation of the state*. This is justified also by the fact that the owners of these wastes are not interested at all to find the hidden, possibly buried stockpiles, because – being hazardous wastes – are afraid of becoming fined, furthermore the cost of destruction would fall upon them.

#### Assessment of stockpiles of pesticide wastes

According to the obligations assumed by SC and other international agreements and to domestic regulations, the obsolete, non-identifiable and those pesticides, the use licenses of which were withdrawn and potentially contain POP active ingredients must be destroyed. To that purpose it was necessary to assess the quantity of the different active and out-of-use

pesticide wastes and the ratio of preparations containing POP active ingredients. Recently several assessments were carried out to this purpose:

*1. Assessment by the Association "Reflex", 2002.*

This environmental NGO (association) in the Western Hungarian city of Győr made in 2002 in three counties of the Mid-Transdanubian region the first assessments, by which they wanted to determine the total quantity of pesticide wastes and the ratio of potentially POP containing pesticides. In storehouses of the three counties *about 50 tons of obsolete pesticides and about 86 tons of packaging material contaminated with pesticides were found.* Among the total quantity of pesticide wastes the ratio of non-identifiable, potentially POP containing pesticide residues in the case of solid preparations was 21,6 %, while in the case of liquid preparations it was 17,5 %.

*2. Nation-wide assessment by the Central Soil and Plant Protection Service in 2003.*

Before Hungary joined the European Union it was necessary to assess the quantity of obsolete, illegally stored or deposited pesticide wastes and waste packaging material contaminated by pesticides. Under the direction of the Central Service the local County Soil and Plant Protection Service Stations assessed nation-wide the quantity of pesticide wastes and waste packaging material (see next page **Table 2**) in 2003. According to this survey *they estimated 314 tons of pesticide wastes in the country, incl. about 60 t POP content or unidentified waste and appr. 600 tons of contaminated waste packaging material.* The latter figure was verified by the quantity of packaging materials collected by the Partnership CSEBER in 2004.

*3. "Pilot" assessment action by the Central Soil and Plant Protection Service in 2004.*

In 2004 a "pilot" assessment action was carried out in the counties where the largest quantities were earlier found. The control action aimed at the determination of POP content of pesticides found in storehouses. In the framework of the action a thorough examination of major pesticide storehouses in three counties (Bács-Kiskun, Pest and Borsod-Abaúj-Zemplén) was carried out.. According to the result of the control action, pesticides with POP active ingredients were not found, however unidentified preparations have occurred.

*Conclusions drawn from the three assessments and the proposed solution:*

*The probable quantity of non-identified or definitely POP containing pesticides amounts about 60 tons in the country. According to the precaution principle one has to proceed as if the total quantity would contain POP active ingredients and thus it must be destructed as hazardous waste.*

Table 2

## Assessment of obsolete pesticide wastes and packaging materials of pesticides carried out by Soil- and Plant Protection Service in 2003

Countries	Stockpiles of obsolete pesticide wastes (kg)						Packaging materials of obsolete pesticides (kg)					
	herbicide	fungicide	insecticide	other	total		plastic	metal	glas	other	total	
Baranya	2 382	1 883	570	2 388	7 223		33 650	10 430	380	2 210	46 670	
Bács-Kiskun	19 941	15 245	3 284	11 650	50 120		21 499	2 691	315	4 722	29 227	
Békés	3 985	415	1 035	3 990	9 425		9 155	2 208	110	725	12 198	
BAZ	9 233	2 878	3 237	11 032	26 380		42 150	11 090	1 070	6 430	60 740	
Csongrád	3 973	6 688	3 275	8 345	22 281		30 869	3 140	410	4 117	38 536	
Fejér	4 136	5 888	1 721	12 637	24 382		10 745	3 645	385	115	14 890	
Győr-Moson-Sopron	2 400	475	437	1 169	4 481		18 315	3 900	100	600	22 915	
Hajdú-Bihar	10 706	3 018	618	9 210	23 552		28 184	9 425	30	4 318	41 957	
Heves	2 192	4 090	1 076	945	8 303		16 090	4 563	0	670	21 323	
Jász-Nagykun-Szolnok	9 592	3 085	2 809	7 772	23 258		15 919	3 552	601	2 947	23 019	
Komárom-Esztergom	2 005	1 280	1 322	4 107	8 714		13 413	5 370	100	30	18 913	
Nógrád	2 587	6 352	689	3 240	12 868		10 415	7 328	251	582	18 576	
Pest	7 811	8 882	7 553	9 545	33 791		15 604	6 118	515	2 490	24 727	
Somogy	1 700	200	320	1 800	4 020		68 000	38 000	20	320	106 340	
Szabolcs-Szatmár	2 070	678	1 333	4 226	8 307		6 314	1 170	90	702	8 276	
Tolna	11 059	3 977	3 891	3 568	22 495		8 871	1 131	20	5 540	15 562	
Vas	8 238	409	1 630	1 775	12 052		14 320	8 402	57	555	23 334	
Veszprém	2 005	1 100	250	740	4 095		6 280	2 050	25	294	8 649	
Zala	2 166	2 249	1 746	1 773	7 934		29 949	18 399	178	1 173	49 699	
<b>Total</b>	108 181	68 792	36 796	99 912	313 681		399 742	142 612	4 657	38 540	585 551	

*Proposed solution for the collection and destruction of pesticide wastes*

Regulation and control of the origin and destruction of pesticide wastes belongs mostly to the competence of two ministries (agriculture, environment). This is why first of all these ministries have to coordinate their programs and to secure/cover the necessary funds for the elimination of pesticide wastes.

To get exact data on the real quantity of the obsolete, hidden pesticide wastes in the country would need a comprehensive nation-wide control, however the competent authorities have neither capacity nor resources for the determination of their effective POP content. According to the estimation of the Central Soil and Plant Protection Service the *capacity of the existing hazardous waste incinerators is sufficient for the destruction of more than 300 tons of pesticide wastes* to be collected (see more: Infrastructure, chapter 2.3.10).

On the ground of the practice that nobody would announce himself one would not reckon that owners of hidden, buried stockpiles of hazardous wastes will present themselves. Therefore in 2005 in counties Bács-Kiskun and Pest and in March and April 2006 in Zala, Veszprém and Somogy the two relevant ministries announced an *interim exemption of sanctions for one or two months and organized actions to collect and destruct pesticide wastes, furthermore partially or totally financed the actions*.

To gather experiences and for better managing it was expedient to organize and execute the actions of collection and destruction in several steps. The most pesticide waste to be found according to the assessment performed in 2003 in the counties Bács-Kiskun and Pest, it was therefore justified to organize the first model action in these counties and later – based on the experiences gathered here – to continue in other counties.

The problem of assessment, collection and destruction of pesticide wastes accumulated during earlier decades became by this proposed method definitely settled, resp. becomes settled, because it is only to be hoped that the actions will continue.

*Results of the collection-destruction actions*

The state of the collection and destruction of pesticide wastes are following:

*a.) Counties Bács-Kiskun and Pest, 2005*

According to results of earlier approximative assessments the costs of the collection, transport and destruction of pesticide wastes to be found in the country would be around 60-80 million HUF. Taking into account the health and environmental risks the Ministry of Environment

and Water separated in 2005 a sum of 25 million HUF to settle definitely and properly the problem of the "historic" pesticide wastes.

This sum was not sufficient for the whole country, therefore the action started as a first step in the counties Bács-Kiskun and Pest, because according to the assessment the most pesticide waste – altogether about 85 tons – were to be found in these two counties.

To be on the safe side the Ministry commissioned the consortium CSEBER carrying out the task with the collection and destruction of 102 tons of pesticide wastes. The action was successfully concluded. *The consortium collected and destructed 128 tons of pesticide wastes. The destruction of the surplus 26 tons was managed/financed by financial contribution of the present owners of the wastes.*

Next to this in five cities/towns of the two counties it was announced to the general public, that pesticide residues will be collected from households. As a result 2784 kg obsolete pesticide residue was collected (Kiskunfélegyháza 260 kg, Baja 800 kg, Kiskunhalas 130 kg, Gödöllő 770 kg, Kecskemét 824 kg).

*b.) Continuation of the action in counties Zala, Somogy and Veszprém in 2006*

Based on results mentioned above the action was continued in spring 2006 in counties Zala, Somogy and Veszprém. These counties lie around the lake Balaton, their selection was justified by the necessity of enhanced protection of the lake. The consortium winning the tender collected and destructed in the framework of this action "historical" pesticide wastes including POP containing wastes.

The authorities announced also in this case full exemption from sanctions, i.e. no legal processes were initiated even in those cases, where the present owner of the waste earlier failed to fulfill his/her legal obligation as to provide for destruction. The period of the action gave to owners of pesticide wastes an interim possibility to settle at last the future of these wastes without legal consequences and in most cases without fees/charges.

*The action "Balaton" resulted in collection of 45,1 tons of pesticide residues in the three counties, though the assessment carried out by the Central Soil and Plant Protection Service in 2003 indicated only 16 tons of such wastes in this region. The MEW contributed to the costs of collection and destruction 7,7 million HUF. The cost of destruction of the surplus 29 tons (6,75 million HUF) was covered by the owners of the wastes.*

*c.) Collection of pesticide residues from the general public in Zalavár*

Similarly to the collection actions from households organized in 2005 in the counties Bács-Kiskun and Pest it was repeated also in county Zala. In summer 2006 in the (small) town of

Zalavár inhabitants and hobby gardeners of the nearby settlements could get rid of their pesticide residues at assigned collecting sites.

*d.) Evaluation, continuation*

On the ground of the two successful actions *it is worth while to extend the collection and destruction to all other counties* and it is hoped for that in 2-3 years it will be possible to clean up these extremely hazardous pesticide residues in the whole country. This will need state fund resources and/or international support.

*2.3.5.3 POP contamination of soils. Deposits, examination of contaminated sites, environmental remediation program, soil information monitoring*

An assessment and analysis of communal and of illegal waste deposits of the country was carried out in 2002-2003 with PHARE support. Surveys, sampling from holes drilled for this purpose and analyses of the samples led to the conclusion, that *on landfills of household wastes no POP containing hazardous wastes (residues of pesticides, PCB containing oils, etc.) worthwhile to mention can be found.*

This finding is supported by domestic regulations, according to which hazardous wastes must not be deposited on communal deposits, however it does not preclude the possibility to find on these or more likely on illegal deposits actually POP containing wastes. POP containing hazardous wastes of high-temperature industrial processes (sludge, flying ashes) are deposited on hazardous waste deposits suitable to accommodate such wastes.

*Cleaning up highly contaminated illegal deposits is a part of the National Environment Remediation Program (OKKP).* In the turn of considering contaminated sites, this program takes into account these deposits as well. The list of the pollutants contains also POPs. However *this program aims first of all the remediation of the most substantial contaminated sites of the country.*

Since the program OKKP has a separate budget as a program of enhanced importance, it is not practical to involve it in plans for reduction of POP emissions, first of all because it deals with “immission type” contaminations and not with emissions. Its database “Kárinfo” contains relatively few actual data on POP contaminations, however some data were practically used for certain investigations (e.g. for searching pesticide residues).

*Important data on contamination of soils* are provided by measurements made on (selected) points of the Soil Information Monitoring (TIM) system, which were carried out related to POPs in every 3-4 years in the last decade. This program is operated by a background institution of the Ministry of Agriculture and Rural Development, namely the National Plant

and Soil Protection Service (ONTSZ) and is professionally supported by the Soil Science Research Institute (TAKI) of the Hungarian Academy of Sciences in selecting measuring points/spots. *The present TIM points provide few data for the investigation of industrial soil contaminations, because the points were selected with respect to agriculture.*

For the time being there is on the average one TIM point for every 77 km<sup>2</sup>. It is worth while to consider to develop this program in such a way, that by selecting new measuring points the resulting data provide a better country-wide representation/coverage. In planning this development, analysis-data of ground water samples taken from monitoring wells operated by VITUKI and/or survey data of the program OKKP might be taken into consideration.

The development of the TIM system would need at the same time substantial financial resources, which is indicated also by the fact, that since the last measurements carried out in 2000 no further data are available because of lack of financial resources.

Considering that the *TIM system provides "immision" type data and in its present form is serving first of all purposes of agriculture*, in drafting short-term measures for the reduction of POP emissions, it is not justified planning the development of this system in the NIP.

#### 2.3.5.4 Conclusions, tasks

The actions organized to collect and destruct obsolete pesticide residues were successful, the quantity of collected pesticide residues was larger than expected. The financial contribution of owners of wastes to the costs of collection and destruction – when the sources of the budget ran out – worked well. *Measures are therefore to be taken to continue the actions to clean up the whole territory of the country from pesticide wastes.*

#### 2.3.6 Summary of future production, use and releases of POPs -conditions of exemptions

Production, import, placing on the market and use of compounds listed by the three international POP agreements is by regulations of the agreements (Articles and Annexes mentioned at each chapter) and by domestic legal regulation strictly forbidden. Therefore one has *not to calculate with future intentional use of these compounds*. Unintentionally formed by-products of certain industrial processes will however in the predictable future unfortunately release POPs. The aim of the measures is to reduce these emissions.

There are *very limited possibilities for exemptions resp. deferring of bans* according to the EU-R., these are the following:



- *Equipment, articles and products in use* may yet contain PCB subject to the conditions of Decree 5/2001.(II. 23.) KöM (see in detail in the next indent),
- DDT may be used as intermediate for the production of Dicofol till 2014, subject to a revision in 2008,

*Domestic regulations related to possibilities of interim exemptions* mentioned above:

- PCB containing oils in existing equipment must be destructed according to Decree 5/2001.(II. 23.) KöM till 31. December 2010 latest, if the concentration of PCB in the oil is higher than 0,05 mass%. If the PCB concentration is lower and the equipment is functioning properly, it may be used further and must be destructed at the end of its life span,
- *Use of DDT for the production of Dicofol has lost its sense after banning the use of Dicofol* by Decrees 6/2001.(I.16.) FVM (MARD) and 89/2004.(V.15.) FVM (MARD), thus Hungary has not requested exemption,
- application of the technical and the gamma isomers (lindane) of HCH for pesticides are banned by both FVM (MARD) decrees above; use of lindane for medical purposes is not advisable acc. to the Health Authority, thus *Hungary has not requested exemption*,
- Use of POPs *for laboratory research and development purposes* and as reference substances is according to the prevailing SC and EU regulation also in Hungary exempted.

It means that *Hungary may annually report to the Secretariat of SC* on Annex 1 and 2 of the SC *only this last one, neglectible amount of POPs used for laboratory purposes. Any other uses of regulated POPs of Annex 1 and 2 of SC are banned in Hungary.*

### **2.3.7 Existing programme for monitoring releases controlling environmental and health effects of POPs**

#### *2.3.7.1 Purpose of monitoring, priority of measurements*

The importance of monitoring is laid down by all the three POP related international agreements (SC Art. 11, AP Art 8, EU-R Art. 9) mostly in connection with research and development. Consequently the primary purpose of monitoring, of gathering and knowledge of observed data is to recognize and assess the POP load of human organism and to take

measures in order to reduce the release of POPs into the environment. This is why as much as possible data – preferably regularly observed data – are needed.

This is most strictly and concretely formulated by the EU-R., according to which primarily the unintentional release of dioxins/furans and PCB as by-products of industrial processes has to be regularly monitored. It is planned therefore that the EC will together with member states prepare such a mechanism and control which will beside the already existing technological emission limit values establish/introduce further ones.

The situation of domestic measurement of concentrations of POPs is as follows:

- Very few measurement data are available on D/F emissions - with the exception of waste incineration. The figures of emission data presented so far in the inventory are calculated values using emission factors taken from technical literature,
- To take samples properly for POP analysis – including in many cases building up or installing necessary equipment – is rather complicated and expensive.
- There are accredited laboratories in the country for such analyses, but their capacity is not exhausted/utilized.

*Measures to reduce POP emissions must be based on reliable measurements and observations.* Only laboratories accredited for given measurements and sampling procedures are able to provide authentic and certified data. Because of the importance of this issue, an analysis of the domestic accreditation is described in Chapter 2.3.10.

Monitoring may be occasional (in case of need), regular or continuous, just as – with respect to organizational framework of the monitoring – domestic or international.

Controlling of limit values prescribed by legal environmental regulations is the *task of the Environmental Inspectorates* operating under the direction of the MEW. This control is carried out at least once every year, when the operating companies/organizations send their annual emission reports to the competent inspectorates. In cases where the compliance with ELVs has to be proved by measurements, the inspectorates request data of measurements, in other cases calculated data are sufficient.

According to Governmental Decree 21/2001. Korm. the Environmental Inspectorate may among other air quality requirements request periodical or occasional monitoring of POP emissions even in cases where any technological ELVs are established for the given technology.

*The obligation of companies for measurements* – with the exception of the case referred to above – might be called upon when an ELV for a pollutant is prescribed. Because such a limit value is presently – in accordance with the international legislation – among the POP emitting

technologies only for D/F emissions of waste incineration established, the measurement of POP emissions of all other technologies must be financed by the (state) budget and/or by international funds and/or by the companies concerned..

#### 2.3.7.2 *Role of different ministries and of their background institutions in monitoring*

##### 1.) *Tasks of the Ministry of Environment and Water and of its regional organizations*

Occasional monitoring for the assessment of emissions not controlled by limit values.

Following possibilities can be taken into account:

- POP emission measurements are built into the annual measurement plans of the laboratories of the Inspectorates constituting thus integral part of it, or
- POP emission measurements are carried out by appropriate organization(s) assigned by MEW. The MEW chose in 2005 and 2006 the latter solution.

As a first step it was decided at which technologies which POP pollutants in which media (air, water, waste/residue) and where are to be measured. *The work began with setting up a plan of the measurements including taking samples and analyses to be carried out by the Partnership for Public Use VITUKI in 2005 and 2006.* Technologies with highest POP emissions (metallurgical plants, power stations, etc.) received priority.

Well-founded measures to reduce POP emissions require reliable measurement data, because emission factors taken from international technical literature do not reflect exactly the local technological conditions. Therefore *supplementary POP emission measurements, the continuation of the measurements is one of the main priorities of the NIP.*

Series of measurements for the determination of POP emissions were carried out mainly by VITUKI Co. from 2005. *The results of the measurements of VITUKI are summarized in Annexes 3, 5, 6 and 8.* Also in 2005 *six companies of the region Northern Hungary D/F emissions were controlled by the laboratory of the Regional Inspectorate in Miskolc (see Annex 4).*

The results of these measurements were used for the analysis of unintentional industrial POP emissions of the country. The financial sources available were sufficient only for 1-1 measurement of each technology, thus no far-reaching conclusions could be yet drawn from

these measurements. The most important conclusion respective the measurements is therefore, that these are to be continued.

In the course of the *measurements in 2006 those of the previous year were principally repeated, however only atmospheric POP emissions of metallurgical technologies were controlled by 1-1 measurement*, because the reduced budget funds were sufficient only for less measurements than in the previous year (*see Annex 5*)

In case of *regular monitoring* the limit values of *D/F emissions originating from waste incineration are to be controlled* with a frequency prescribed by Decree 3/2002.KöM. The D/F limit values to be controlled are the following: for atmospheric D/F releases 0,1 ng-TEQ/m<sup>3</sup> and for waste water coming from flue gas cleaning 0,3 ng/litre. The operators of waste incinerators have thus to report annually – inter alia- on the compliance with these limit values to the environmental authority.

The operators who are obliged because of their technology applied by resolution of the environmental authority to carry out measurement of *atmospheric release of benz(a)piren*, one of the PAH substances causing cancer, have similarly furnish data in their annual reports.

The measurement of atmospheric release of *other POPs is not yet obligatory*. The emission data of these POPs are calculated by the so-called top-down method by multiplying (annual) production data with emission factors.

Those obliged to report on the atmospheric release of these and other air pollutants give their annual accounts, according to the long since operating emission reporting system, by filling in so-called LM sheets (quantity of air pollution) to the inspectorates.

*Basic networks of surface and ground water quality* are monitoring systems operated by state resources, they *provide regularly immission data* and are run by VITUKI. The related tasks are the following:

*a.) Monitoring of water quality of the Danube Basin*

Collection of harmonized water quality data of the Danube Basin is the task of the (sub)group “Monitoring Laboratories and Information Management” operating in the framework of the Danube Basin Environment Program. A part of this program is the operation of the Transnational Monitoring Network (TNMN) started in 1997. Hungary carries out in this framework at nine sections of the reservoir of the Danube laboratory analyses with a monthly frequency and twice a year analyses of sediments.

The analysis of specific water quality characteristics – first of all micro-pollutants - in the framework of this monitoring activity is carried out by reference laboratories. In Hungary the reference laboratory is VITUKI.Co. Comparability of results of analyses of reference laboratories is guaranteed by common participation in verification programs. By taking into account the directives of international agreements on the examination, evaluation and qualification of frontier waters (Helsinki Convention and Danube Convention) it becomes possible to harmonize the system of examination and qualification of surface waters according to international practice.

*b.) Analytical data of contamination of ground waters are contained by the database FAVIZ (“ground water”) operated by VITUKI.*

The database FAVIZ contains country-wide data of immission character.

*In connection with quality protection of surface waters preparations for a new data reporting system is under way which is based on the Decree 28/2004 (XII. 25.) KvVM containing established technological ELVs for water contaminating substances.*

This decree controls emissions of only two POP compounds. Operators have according to this decree to report regularly each year to the inspectorate on the contents and composition of contaminants of waste water on reporting sheets VAL and VÉL, similarly to the reporting of air pollutants. Testing of the new reporting system for the baseline water quality (VAL) and for the annual water quality data (VÉL) happened in 2006 and the first “real” reporting of the operators to the inspectorates occurred in 2007.

*Regular monitoring of waste management is established by the fact, that operators have according to Decree 16/2001.(VII. 18.) KöM (MEW) annually report to the inspectorates on hazardous wastes, including also POP containing wastes, listed by EWC codes. The environmental authority is thereby able to follow the quantity, location as well as method and of destruction of hazardous wastes formed. A new regular monitoring task will arise as the control of limit values established lately by the EU-R. in Annexes IV and V for POP contents of wastes will enter into force.*

*2.) Monitoring tasks of the Ministry of Agriculture and Rural Development (MARD) and of its background institutions*

Data of immission character on POP contamination of soils are provided on the one hand approximately every 3-5 years by the Soil Information Monitoring (TIM) sytem supervised by

the MARD, on the other hand local county plant protection service stations operating as background institutions of the MARD are controlling POP compounds getting by the use of pesticides into soil, plants and crops.

The tasks of these institutions are described in detail in Chapter 2.2.2.

### *3.) Monitoring tasks of the Ministry of Health (MH) and of its background institutions*

Till now the National Institute of Public Health (OKI), within its framework the National Scientific Institute of Alimentation (OÉTI), supervised by the Ministry of Health has dealt with the monitoring of POPs in humans and food.

POP levels of target groups defined by domestic and international programs, respectively of human milk, body tissues and foods were controlled with regular frequency according to internationally accepted protocols.

More than 90 % getting into our body is taken up by foods, therefore these investigations deserve special attention.

Both domestic (NEKAP) and international programs (WHO) deliver observations /measurement results continuously, the country joined international programs as well. For more detail see Chapter 2.3.11 on public health.

### **2.3.8 Current level of information, awareness, training and education among target groups**

POPs are among the most toxic compounds, therefore the international agreements stipulate the information, raising of awareness and free accession to data of the general public and the information, education and training of different target groups (decision makers, leaders, teachers, trainers, sensitive groups, scientists, technical experts, workers).

Since such activities are in Hungary generally less developed careful preparation is needed and appropriate resources are to be provided for. The rather complex character of the issue needs therefore carefully considered and well harmonized activities. Different target groups require differentiated information:

- Inspectors of the Environmental Inspectorates have to acquire well-founded, more detailed knowledge, because they are in direct contact with POP emitting companies/plants or exactly the specialists of the Inspectorates' laboratories carry out the measurement of emissions.

This purpose was served by professional conferences held in the framework of the UNIDO project first of all for the specialists of the Inspectorates and for environmental officers of companies. Several such conferences were already organized by the MEW and further conferences are planned.

- It is an important task to present to political and economic decision makers a clear picture of the issue, this needs the compilation of executive summaries/compendia of the most significant topics.
- Another target group is the general public proper, where an easy-to-understand, unambiguous drafting is of utmost importance. Because more than 90 % of the POPs taken up by the human organism originates from foods and foods transfer POPs emitted to the environment earlier, many years, even decades ago, people at large can today hardly do anything against the detrimental effects of POPs. People can be armed against sensation hunting and frightening first of all by authentic information.

According to the international agreements *the general public has to be informed about hazardous substance contents of products and articles, the health risks caused by POPs, the possibilities of lessening the risks, of elimination or decreasing of POP emissions and about the use of alternative substances.*

Further tasks concerning the population:

- To make public every information related to POPs (except classified information according to prevailing legal regulation),
- Compiling and execution of training and practicing programs on environmental and health effects, on prevention of emissions and on pesticides substituting POPs.. These programs have to be aimed at lesser informed groups as well as at groups more exposed to harmful effects of POPs ( e.g. women, children, lesser educated people).

Following actions/measures served so far a broader information of the public:

- In order to disseminate specific environmental information, the national POP inventory was published on the internet home-page of the MEW.
- An article presenting and analyzing the domestic POP inventory and the legal background was published in the Hungarian Chemical Journal, the official newspaper of the Hungarian Chemical Society (MKL, April 2004).

- A number of articles were published in different newspapers and periodicals on the risks and hazardousness of obsolete waste pesticides, on their collection and destruction.

Further actions have to follow those carried out so far, competent training and education institutions (MEW, MH, MARD and their background institutions) are available.

### **2.3.9 Relevant activities of non-governmental stakeholders (NGOs)**

The main purpose of activities related to POPs is to preserve human health. It is expedient to *involve non-governmental civil organizations having frequent and direct contacts with the general public* in the fulfillment of this purpose in a wide-range and conscious manner, first of all those “green” environmentalist NGOs, which are efficiently representing the public.

They can and have to emphasize the importance of enlarging/deepening the knowledge related to POPs, to broadly disseminate pertinent information and to urge to active participation in protection against and prevention of emission of POPs. Since POPs are among the most toxic substances (e.g. dioxins), authentic information of the general public on effects and risks caused by POPs is of utmost importance.

The green organization perform useful activities when they inform different groups of society, organize training courses and other public events, create and operate home-pages on the internet, etc. They have possibilities to get into contact with foreign environmental NGOs, to exchange information, to get or render help. There is an international green network dealing with POPs, the *International POP Elimination Network (IPEN)*, the Hungarian member organization of which carries out useful activity by informing the public.

Most of the domestic green organizations are connected into a network, which helps cooperation, distribution of tasks and a more efficient participation in tenders. This network has more than 300 member organizations. Already in 2004 a poster was presented at the nation-wide meeting of green organizations giving information on the quantity of obsolete, abandoned pesticides.

Two civil organizations joined so far to the concrete activities of reducing POP emissions:

- Association REFLEX for the Protection of the Environment in the city of Győr assessed residues of POP containing pesticides in three Trans-Danubian counties. It is remarkable, that in the course of a former project carried out in close cooperation with a neighboring Slovak green organization collected pesticide residues were as a pilot/demonstrative action destructed by incineration.



- Civil Centre and Archives Foundation of the region of Hajdúság in the town of Hajdúböszörmény is the domestic member of the international network IPEN mentioned above and undertook the domestic dissemination of POP related information and the translation of the text of the Stockholm Convention into an easily understandable Hungarian.

These two civil organizations were invited to participate in the preparation of measures to be taken, their representatives participated actively in the professional conferences and in meetings of the inter-ministerial POP committee- These green organizations cover their costs by competition on tenders.

Concrete activities/measures of civil organizations are possible on the following fields:

- To try to find obsolete, abandoned stocks of pesticide residues not yet found and to collect the residues, this can be done by those civil organizations, which have appropriate permit to do so,
- To mediate and represent complaints of the general public related to unintentional POP emissions released as industrial by-products.

*Further tasks:* to prepare and edit information leaflets/brochures on the harmful effects of POPs in order to support information activity of green organizations towards the general public, furthermore civil organizations are to be invited also in the future in the preparation of decisions/measures related to POPs and to participate in relevant conferences.

### **2.3.10 Overview of technical infrastructure for POPs assessment, measurement, analysis, alternatives, research and development**

#### *2.3.10.1 Research and development activities*

Background institutions of ministries, universities and research institutes of the Hungarian Academy of Sciences are the places where scientific experiments and research activities are carried out in relation with POP substances, active ingredients of pesticides, emissions and new substances. In connection with POP substances on two fields are R&D activities domestically timely:

1. Research of *destruction processes of POP containing wastes by non combustion methods*. Necessary technical knowledge is available, but these processes are rather expensive. Since the capacity for incineration of hazardous waste is sufficient, *the destruction of POP containing hazardous wastes is planned by domestic incineration*.
2. The international agreements contain provisions for *interim revisions of stipulations* (prohibition, restriction, reduction of emissions) and for adding *new POP substances to*

*the list of controlled compounds.* Research connected with these issues is done by the National Institute of Chemical Safety (OKBI).

The volume of domestic research activity is restricted by the rather limited availability of budget resources, it is therefore more realistic to take into account the application of foreign/international research results.

#### 2.3.10.2 *Technical infrastructure*

##### *a.) Assessment of the capacity of waste incineration*

Capacities of domestic hazardous waste incinerators *suitable for the incineration of POP containing or unidentified pesticide wastes and of PCB containing dielectric fluids are the following:*

Onyx Hungary Ltd. (Dorog)	800 t/y
Waste Incineration Ltd. Győr	200 t/y
ÉMK Waste Incineration (Sajóbábony)	480 t/y
Ecomissio Ltd. (Tiszaújváros, Tiszavasvári)	480 t/y
Fűzfő Waste Incineration Ltd. (Balatonfűzfő)	240 t/y
<b>Total</b>	<b>2200 t/y</b>

This capacity is partially contracted by long-term contracts, however the non-contracted capacity is several times higher, than the quantity of about 300 tons of POP containing or unidentified pesticide residues and of about 250 tons of PCB containing dielectric fluids to be destructed.

##### *b.) Assessment of demands of measurements*

In Chapter 2.3.7 on monitoring it was presented, that a reliable assessment of POP emissions needs occasional as well as regular emission measurements even at those technologies, where technological ELVs are not established. Emission factors used to calculate emission data can be improved based on accurate measurements and - consequently - POP emissions can be calculated more precisely.

Several – mostly thermal – technologies may unintentionally release POPs into the air, water and waste. The reliability of the first national POP inventory was reduced by the fact, that – in international comparison – in that time very few measured emission data were available. Unintentional POP emission data of several industrial processes were on the basis of measurements carried out in 2005 and 2006 corrected (Annexes 1 and 2).

Measurements in 2005 and 2006 aimed at the determination of D/F, PCB, HCB and PAH releases to air, solid wastes/residues and technological waste water. The measurements were carried out at those typical POP emitting – mostly metallurgical and power generation – technologies, where measured emission data were not at all or only partially available. The MEW provided for the POP emission measurements 22,5 million HUF from state budget resources.

*c.) Assessment of measuring/analytical capacity, the necessary laboratory background*

Measurement/chemical analysis of POPs – especially of dioxins/furans and PCBs – needs an up-to-date background, equipment/instruments, expert personnel, standards. This background is now available in the country, even if the number of up-to-date laboratory equipment is somewhat limited. Comparative measurements with laboratories of foreign institutions (e.g. TÜV) proved, that the accuracy of domestic measurements is adequate. Sampling, preparation and the analysis proper is limited to *laboratories accredited for this task*.

Evaluation of measurements made by the laboratories of the regional Environmental Inspectorates, comparison of the results with relevant reference BATs of the given technologies and possible decision to take necessary measures based on this comparison is the task of the competent inspectorates.

*d.) Accredited laboratories, system of accreditation*

In Hungary a number of laboratories carry out analytical determination of POP substances. In the following only those laboratories are discussed, which were found suitable for this activity and are therefore accredited by the National Accrediting Board.

*National Accreditation Board (NAT)*

The National Accreditation Board (hereinafter referred to as NAT) established as of 28 September 1995 with Act XXIX of 1995 modified with Act LXXVIII of 2005 on the accreditation of laboratories, certifying and controlling organisations, is the only national institution with exclusive rights which operates as a non-profit public body. Its legal supervisor is the minister for economy and transport.

Accreditation is the official acknowledgement of that an organisation is suitable for carrying out certain activities (examinations, accreditation, control). For the implementation of the articles of international agreements on certifying compliance, the Parliament decided in Act

XXIX of 1995 about creating a *national accreditation system* complying with the international practice and establishing the *National Accreditation Board*.

The base of the accreditation is represented by the MSZ EN 45000 and the MSZ EN ISO/IEC 17025:2005 standards series on the NAT and on the organisations to be certified, also the international accreditation guidances, as well as the profession-specific requirements issued by NAT. Accreditation is valid four years, on the condition that the organisation still meets the criteria on the annual review

#### *Accredited laboratories*

As a consequence of the above mentioned, the number of certified laboratories changes, depending on the result of the annual review. Currently *there are about 50-70 laboratories certified in the country for sampling and analysing organic pollutants*. Amongst these are the laboratories of the environmental inspectorates and the ÁNTSZ labors in each county, furthermore laboratories of universities, national background institutions and a few company chemical laboratories. As obtaining of the accreditation for the sampling and analysis of dioxins and furans is the most problematic, these laboratories are listed in *Annex 7*.

#### **2.3.11 Identification of impacted populations and environment. Assessment of human health hazards and POPs level in foods.**

The efforts for the reduction of POP releases aim to minimize the POP load of the human body. Majority of the POPs in human body are taken by the foods. Therefore the POPs came to the centre of the environmental health attention, in the recent decades their hazardous impact on human health was clearly verified.

These are the main reasons to analyze the POP contents of foods and the investigations of impacts of POPs to the health. The “host” of the investigations, analysis of these issues was so far the National Institute for Food Hygiene and Nutrition (hereinafter OÉTI).

The sampling and analysing methodology of the following international programmes were adopted by OÉTI for their investigations:

- Food Contamination Monitoring and Assessment Programme of the Global Environmental Monitoring System (so called GEMS/Food) organised by WHO, where all of POP substances listed in the Stockholm Convention can be examined,
- WHO European Centre for Environment and Health (WHO-ECEH) organised exposure investigations of PCBs, PCDD and PCDF in breast milks in 1987-88, then 1992-93, in 2000-2001 in order to follow the changes of exposition levels.

*Results of the examinations*

The majority of the 12 POP substance groups regulated in the Stockholm Convention and the 4 further POP substance groups included in the Aarhus Protocol are pesticides, a smaller part is industrial product, and an other smaller part is represented as by-products generated during certain industrial processes. Of this ratio it is most likely, that the POPs mainly get into humans from the soil, plant cultures – directly or indirectly via productive animal live stock by the food chain.

The POPs may enter human body via respiration (mainly the PAHs), but this amount is neglected compared to the amount of POPs taken through food. At the same time the POPs deposited from the air to the soil and entering the body by the food chain can cause human exposition. The POPs are all – though to a different extent – toxic, and besides, as their name mentions, extremely persistent, their degradation is indicated by their long half-life period.

Due to their accumulation in the human or animal organisms, the special situation may occur, that concentrations in the living organisms – primarily in the fat-tissues – can become magnified by up to several thousand times higher than that of the ambient air, water or soil.

Polichlorinated substances via the food chain can get into food in higher concentrations. Milk and dairy products (e.g. butter, cheese), fish, cattle, pig or chicken and their fat, or the breast milk itself are the absorbers. The competent authorities are watching and monitoring the POP concentrations regularly.

The most measurement data of POPs are available for DDT and its metabolites, for PCBs and dioxins & furans.

The next table shows the limit values of *pesticide residues* in vegetable and animal foods according to the amended decree 17/1999 (VI. 16.) EüM (MH):

Pesticides	Vegetable food	Limit value (mg/kg)	Animals	Food-products	Limit value (mg/kg)
Σ DDT + DDE + DDD expressed in DDT	dried tea, spices, other vegetable foods	0,2 0,05	All live stock	Muscle, fat, guts Milk, dairy-product Eggs, egg-products	1 0,04 0,1
Aldrin + dieldrin expressed in dieldrin	dried tea, spices, other vegetable foods	0,02 0,01	All live stock	Muscle, fat, guts Milk, dairy-products Eggs, egg-products	0,2 0,006 0,02
Endrin			All live stock	Muscle, fat, guts Milk, dairy-product Eggs, egg-products	0,05 0,0008 0,005
Heptachlor + heptachloro-epoxid			All live stock	Muscle, fat, guts Milk, dairy-product Eggs, egg-products	0,2 0,004 0,02
HCH-alfa and beta isomers	dried tea, spices, other vegetable foods	0,2 0,02	All live stock : alfa-isomers All live stock: beta-isomers	Muscle, fat, guts Milk, dairy-product Eggs, egg-products Muscle, fat, guts Milk, dairy-product Eggs, egg-products	0,2 0,004 0,02 0,1 0,003 0,01
Hexachloro-benzene (HCB)	dried tea, spices, other vegetable foods	0,01 0,01	All live stock  Fish, reptiles	Muscle, fat, guts Milk, dairy-product Eggs, egg-products Eatable tissues	0,2 0,01 0,02 0,5

Important characteristic for the POP load of the body is the TDI (tolerable daily intake) value for the human intake of pesticides, which is at Σ DDT 10 µg/body kg, at gamma-HCH (lindane) 5 µg/body kg, and for HCB 0,6 µg/body kg according to the recommendation of JMPR (Joint Meeting on Pesticide Residues).

*It is remarkable that Hungary has banned the use of DDT and other pesticides already in 1966. In spite of that, the presence of DDT and its metabolites are provable by investigation data also currently in the fat-tissue of the population.* The Institute OÉTI is dealing since 1960 (!) with the measurements of DDT and its metabolites in the human fat-tissue. The reason of the presence of DDT residues in the human fat-tissue is, that these substances have accumulated in the biosphere and can be degraded very slowly.

*The examinations were and are mainly on the POP content of mother's milk, as it is a continuously monitoring activity during the domestic and international investigation programmes. While in the 70's and 80's the **DDT contents** in the national breast milk samples were multiples of the German or Austrian examination results, nowadays they are approximately the same or lower, so significant improvement can be verified. The GEMS/Food data approved that - in respect of the DDT load - the **mean value** measured in 2001 was 25 µg/kg breast milk, while between 1976-86 it was about 340 µg/kg.*

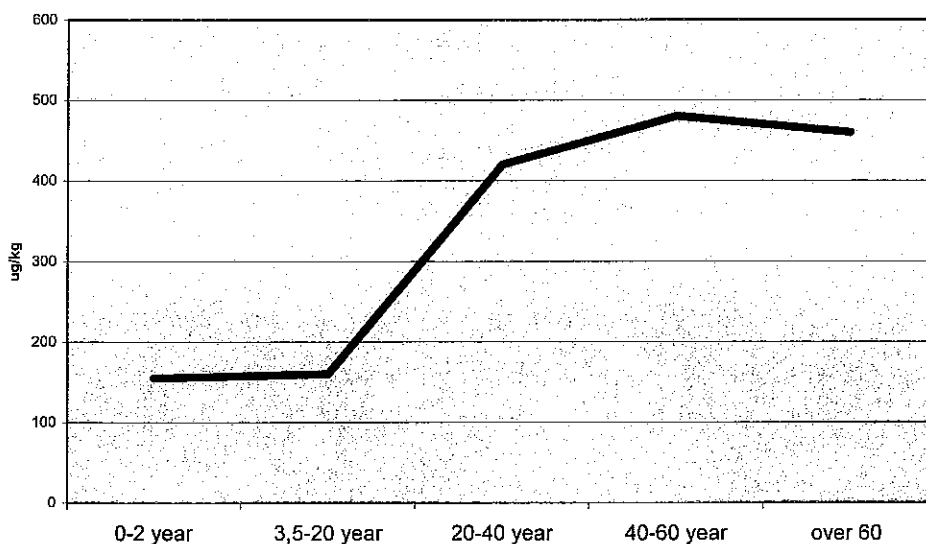
The measurement results confirmed that the **HCH and HCB mean content in human milk** is less than 0,004 mg/kg and the contamination can not be detected from each sample. However, the DDT and its metabolites have higher measurement values than other pesticides, the weighted mean value was about 0,025 mg/kg in human milk.

Same applies to the **PCB content of the breast milk samples**, where in a certain degree more favourable data were measured recently.

The expositional examinations were partly carried out in accordance with the WHO protocol within the frame of the WHO programme, and partly in frame of the National Environmental Health Action Programme (NEKAP), so these are validated examinations. During the latter programme the concentrations of PCB, HCH, HCB, DDT and their isomers in the breast milk were examined by counties, and they found that the POP concentrations of the samples taken from different areas are significantly different. Obviously the mothers are being exposed to higher expositions at certain places than in other areas, which requires further analyses.

The Institute OÉTI carried out a comprehensive measurements in 1994 for the estimation of the PCB content of the human fat-tissue. The investigation was completed in different age-group. The result verified, that the total PCB accumulation in the human fat-tissue correlates with the age. The following figure illustrates the results of the investigation:

Total PCB content of human fat-tissue samples in different age groups, 1994



These results confirm that PCBs regularly get to the body of the people. However, the results are very limited both in Hungary and internationally, we have to carry out further assessments of the PCB load of humans. The total *daily intake of PCBs* is about 150 ng/body kg/day in Hungary which is less than the mean value of 200 ng/body kg/day of the developed countries.

Measurements of *dioxins/furans exposure level* are available only from the mother's milk, based on the data of WHO-ECEH investigation programme mentioned. According to the requirements of WHO in 1998, the tolerable daily intake (TDI) is 1-4 pg I TEQ/ body weight kg. Here again principally the infants and babies belong to the endangered group of humans.

The sampling regions of WHO-ECEH investigation in 2000-2001 were the same as in the previous measurements in 1987-88 and 1992-93, in order to compare the results. The selection of three sampling region was decided on the principle that beside the capital Budapest an industrial and an agricultural region were represented in the measurements. The results of WHO-ECEH investigation programme from 2000 and 2001 on the dioxin content of mixed breast milk are presented in the next tables:



Dioxin and PCB content of the mix breast milk  
expressed in ng/kg fat in three Hungarian region  
(data of WHO-ECEH programme)

Region	Fat %	I-TEQ	WHO-TEQ	PCB-TEQ	2,3,7,8 TCDD	Total TEQ PCDD+PCDF+PCB
Budapest	3,5	6,45	7,46	4,20	1,14	11,66
Komárom- Esztergom (industrial)	3,6	4,54	5,26	2,38	0,75	7,64
Szentes and its area (agriculture)	5,0	5,91	6,79	2,87	0,9	9,66
<b>Average 2000</b>		<b>5,63</b>			<b>0,93</b>	
<b>Average 1988</b>		<b>10,60</b>			<b>3,55</b>	

Based on the table above can be stated that both I-TEQ and the 2,3,7,8 TCDD („Seveso dioxin”) level have been reduced significantly during a decade and has not occurred any basic difference among the three region investigated.

*The risk assessment of chemical substances in food* is expressed by the quotient of the tolerable daily intake (TDI) and the estimated existing dietary intake. Then – based on the measurement results of POPs – the possible and existing risks can be calculated.

### **Conclusions:**

The majority of POPs have been banned and their emission is strongly limited in Hungary. The POPs already emitted, even if slowly, will break down, and the same applies to the POPs, which have entered the food chain earlier. *The most reasonable is if measures are taken at the polluting sources, to minimise the POPs getting into the environment, as it is difficult to influence their health damaging impact afterwards.*

*The institutes for examination of POP exposition of humans and of foods, crops, vegetables, fruits, etc. will be drawn together in the next future during the reorganisation programme of the structure of the state administration.*

### **3. Strategy and action plan elements of the national implementation plan (NIP)**

#### **3.1 Policy statement**

The compliance with the Stockholm Convention requires any additional legislative task of the Hungarian ministries. The implementation of the measures of the NIP will be co-ordinated by the Ministry of Environment and Water (MEW).

Thus, this subchapter refers to the endorsement of the NIP by a Ministerial Decree as follows: “The Minister of Environment and Water confirms the National Implementation Plan for the elimination resp. reduction of Persistent Organic Pollutants (POPs) elaborated by the technical and financial assistance of UNIDO and orders its publication and the implementation of the measures.

The Minister of Environment and Water.”

This involves the commitment of the Hungarian Republic to carry out the measures of the NIP deduced from the Stockholm Convention.

Hungary has met already most of the requirements of the Stockholm Convention and is fully committed to comply with the planned further tasks of the NIP.

#### **3.2 Implementation strategy**

The main purposes of the NIP are protection of human health and the environment from the harmful POPs impacts. The implementation of the NIP is an opportunity to an integrated approach in solving the POPs related problems, which will be employed during the coordinating activities. By the implementation of the separate measures, it is foreseen that all the provisions of the Stockholm Convention (SC), Aarhus POP Protocol (AP) and POP regulation of EU (EU-R.) will be fulfilled.

The *implementation strategy* is based on the following principles:

- Out of the compliance with SC, also the provision of the AP should be complied with;
- Compliance with the EU Regulation 850/2004/EC on the reduction of POPs release;
- Adherence to “the polluter-pays” principle;
- Adherence to and use of technologies and applications of the BATs;
- Integration with overall env. management and sustainable development policies;
- Adoption of the particular rules and guidelines;

- Inclusion of public and stakeholder participation;

**Main priorities of the NIP in Hungary are the followings:**

- clean-up the country from obsolete pesticide residues (with or without POP content);
- environmentally safe disposal of equipments filling with oils of PCB content;
- producing measurements data on the unintentionally generated POP releases;
- application of BATs and BEPs at the industrial technologies.

### 3.3 *Activities, strategies and action plans*

#### 3.3.1 **Activity: institutional and regulatory strenghtening measures**

*Activities of NIP to strengthen the institutional background:*

*a.) Continuing the activity of the Inter-ministerial Committee (IMC) to harmonize the tasks concerning more ministries in reducing POP emissions, destruction of stockpiles, in coordination of national and international work regarding listing of new POP chemicals and for periodical control of measures taken.*

*Responsible ministries (see abbrev.): MEW also for co-ordination, MARD, MH, MET and MF*

*Deadline: immediately after approval of NIP.*

*b.) Preparation of guidelines for and regular training of Environmental Inspectors on regulatory and controlling tasks regarding POPs and on application of BATs, especially on technologies listed in Parts II and III in Annex C to the SC.*

*Responsible: MEW*

*Target groups: Environmental Inspectors*

*Deadline: from 2008, ongoing*

*c.) Organization annually conference for information, awareness raising and training/education of the professional public, including NGOs.*

*Responsible: MEW, POP-IMC*

*Target groups: professional civil servants of ministries, environmental experts and responsible managers of companies, (environmental) NGOs*

*Deadline: from 2007, ongoing*

Explanation:

**The Hungarian legislation complied the requirements of the SC with minor gaps already by 2004. As the EU R. on POPs - which includes also the provisions of SC and has even more strict ones than of the SC - is in force from 2004, these minor legislation gaps were**

solved. Thus, no need for any further domestic regulation on POPs, because the EU-R. is valid also in Hungary.

Several ministries (MEW; MARD, MH, MET, MF, etc.) are partially involved in the control of POPs consumption, releases, trade, etc. The background- or territorial institutions of the ministries play very important role in the **enforcement of the POP regulations**, especially the environmental inspectorates (more details in subchapter 2.2.2).

### **3.3.2. Activity: measures to reduce or eliminate releases from intentional production and use**

*Measures to reduce releases of intentionally produced and used POPs:*

a.) *Controlling that banned pesticides are not imported, placed on the market nor used.*

*Responsible: MARD / Service for Plant and Soil Protection (control/ testing plants)*

*Deadline: ongoing*

b.) *Controlled POPs shall be prohibited also as constituents of articles According to § 1 of Art. 3 of Regulation (EC) 850/2004. Drafting legislation on the details and guidelines for the producers, traders, users and competent authorities.*

*Responsible: MET (MEW, MH, MF and Duty Service)*

*Deadline: 30. Jun 2008*

Explanation:

Once Hungary was producer of the pesticides and used a lot of it. Between 1950 and 2000 almost 2,4 million tons pesticides were used in the country, 19 % of this (450.000 tons) were products containing POP active substances. Its active POP substances were about 66.500 tons and was distributed and used in the decades of the last 50 years.

By the present decade the production, use, export and import of every regulated POP substances, - even more POPs than regulated in the SC - were banned by more ministerial orders and the final prohibition of all of these compounds was effected from 2001

The main task remaining is to monitor the banned, illegally used pesticides, furthermore to control that any product shall contain regulated POP substances. This is not required by the SC but by the EU-R., and belongs to the competence of the Ministry of Economy and Transport, because it deals with the regulation of products and their constituents.

### **3.3.3. Activity: production, import and export, use, stockpiles and wastes of Annex A POPs pesticides (Annex A, part 1 chemicals of SC)**

This subchapter refers to the:

- production and use of POP pesticides and its consequences examined in subchapter 3.3.2
- waste residues of obsolete POP pesticides which will be examined in subchapter 3.3.8

### **3.3.4. Activity: production, import and export, use, identification, removal, storage and disposal of PCBs and equipment containing PCBs**

**(Annex A, part II chemicals of SC)**

*Measures:*

*a./ Evaluation of time schedules set up by the Env. Inspectorates for the destruction of PCB containing waste equipment and their PCB content, harmonization with existing incinerator capacities in accordance with the National Waste Management Programme*

*Responsible: MEW*

*Deadline: ongoing (in accordance with annual reports of EIs)*

*b.) Companies are obliged to report by 31 March of each year on the progress of dismantling PCB containing equipment. Environmental Inspectorates control the dismantling and destruction. Update the records on the companies and report to MEW. If necessary MEW decides on further measures*

*Responsible: Environmental Inspectorates, MEW*

*Deadline: 30 June, each year*

*c.) The permission to use PCB containing equipment terminates on 30 June 2010, cleaning and optional utilization of the housing of the equipment and destruction of PCB contents has to be finished by 31 December 2010.*

*Responsible: operators*

*Deadline: 31 December 2010*

*d.) Checking the fulfillment of the measure written in point c.), furthermore taking sanctions against the companies concerned in case of non-compliance.*

*Responsible: env. inspectorates*

*Deadline: 31. December 2011*

**Explanation:**

This subchapter refers to and consists of two important provisions:

- Ban of the production and use of PCBs in **new equipments**: regulated by EU-R. adopted;
- Implementation of measures aiming the assessment, collection and safe disposal of **existing equipments** having oils with PCB content. This is one of the high priority measures of the NIP and it is being implemented by the enforcement of the domestic regulation 5/2001. KöM (and also based on the prescription of the international POP agreements mentioned).

### **3.3.5. Activity: production, import and export, use, stockpiles and wastes of DDT (Annex B chemicals of SC) if used in the country**

*Remark: further measures are not necessary.*

- DDT is not used in Hungary any more, its production and use were banned in the sixties of the last century. The details were in chapter 2.3.3 presented.
- As far as the obsolete waste residues of the historical DDT use is concerned, its collection and environmentally safe disposal is part of the actions detailed in chapter 3.3.8

### **3.3.6. Activity: register for specific exemptions and the continuing need for exemptions (article 4 of SC)**

Comment:

*Hungary has not required any specific exemptions to Annex A and B chemicals of the SC.*

Domestic regulations related to possibilities of interim exemptions are:

- **PCB containing oils in existing equipment** must be destructed acc. to Decree 5/2001.(II. 23.) KöM till 31. Dec. 2010 latest, if PCB concentr. of the oil is higher than 0,05 mass%. If the PCB conc. is lower and the equipment is functioning properly, it may be used further and must be destructed at the end of its life span,
- The possibility to use of **DDT** for the production of Dicofol has lost its sense after banning the use of Dicofol by Decrees 6/2001.(I.16.) FVM (MARD) and 89/2004.(V.15.) FVM (MARD), thus Hungary has not requested exemption,
- application of the technical and the gamma isomers (lindane) of **HCH** for pesticides are banned by both FVM (MARD) decrees above; and the use of lindane for medical purposes is not advisable acc. to the Health Authority.

### 3.3.7. Action plan: measures to reduce releases from unintentional production (article 5 of SC)

*Measurers:*

a.) *Measurements of emission concentration in samples from air, technological waste waters and residues of POP emitting industrial technologies and sources*

*Responsible:* MEW (setting up measurement plan and co-ordination),  
VITUKI Co. (taking samples and measurements)

*Deadline:* 31 October of each year

b.) *Evaluation of the measurements, comparison with emission parameters achievable by reference BATs, taking measures to introduce them (e.g. filtering, flue gas cleaning, etc.)*

*Responsible:* MEW, Environmental Inspectorates concerned

*Deadline:* ongoing from 31 October 2007

c.) *Translation of available POP BAT documents and elaboration of guidelines, furthermore extension of this activity to other POP emitting industrial technologies*

*Responsible:* MEW for coordination

*Deadline:* ongoing

d.) *Introduction, implementation of POP-BATs and BEPs and its control.*

*Responsibles:* operators ; for the control: env. inspectorates

*Deadline:* ongoing from 31 October 2007

Comments: The topic concerned were detailed analysed in chapter 2.3.4 incl. the past, current and future situation. The measures represent two of the high priorities of the NIP:

- Measurements of the uPOP releases of POP-technologies should be carried out in order to have more reliable emission data. Based on these data, measures can be taken if necessary. If obligatory ELVs are prescribed for specific technologies, the companies should cover the costs of the measurements. Else – in lack of ELVs – the financial source may be the state budget or international subsidy.
- Application of POP BATs from 2007 is one of most important environmental regulation of this decade and its control will be an important task of the environmental inspectorates. The companies should cover the expenses of the investments for the introduction of BATs and BETs. The “POPs” knowledge of the environmental inspectors should be improved, as it was one of the measures of the institutional strengthening.

### **3.3.8. Activity: measures to reduce releases from stockpiles and wastes (article 6 of SC)**

*Measure to be implemented:*

*Clean-up 14 counties not yet cleaned from pesticide wastes including residues containing POPs. The cleaning actions executed in 2005-2006 has to be continued using the experiences gathered (further public procurement procedures, each regions concerned, with slightly different timing to avoid peak loads in transport and incineration)*

*Responsible: MEW, MARD*

Explanation:

*Due to the huge amount of pesticides used once in Hungary, can be supposed that there are abandoned, hidden, buried obsolete stocks of it in the country. It is therefore of great importance that **decisions on collection and destruction** of the waste residues of pesticides and on planning of the necessary waste incineration capacity have been begun and partly performed. At the same time it is a task of the National Waste Management Plan, too.*

The collection and destruction of unidentified – potentially POP containing – pesticide residues were carried out in five counties so far very successfully.

Exact identification of POP containing wastes is impeded by the fact, that the chemical analysis of POP content is very expensive. It would be not worth while to spend much energy, money and time on their identification while these residues – either containing POPs or not – are counted among hazardous wastes and must according to the relevant regulations in any case be destructed.

Based on both successful collection actions *it is worth while to extend the collection and destruction to all other counties* and it is hoped for that in few years it will be possible to clean up these extremely hazardous pesticide residues in the whole country. This will need state fund resources and/or international subsidy.

### **3.3.9. Strategy: identification of stockpiles, articles in use and wastes**

Comments: all these topics have already been concerned and examined, as follows:

- stockpiles of obsolete waste-residues of pesticides containing POPs: already concerned in the previous measure No. 3.3.8;



- articles in use: measure No. 3.3.2 b. includes this topic, i.e. controlled POPs shall be prohibited also as constituents of articles according to § 1 Art. 3 of EU-R.;
- PCB content of articles in use (equipments such as transformers, etc.) shall be disposed by the end of 2010 according to measure 3.3.4;
- waste categories (with setup of EWC code system) were determined by an EC regulation adapted to the Hungarian legislation with reg. 16/2001. (VII. 18.) KöM.. This includes limited identification, distribution possibilities of POP containing wastes. More details in subchapter 2.3.5.1.

### **3.3.10. Activity: manage stockpiles and appropriate measures for handling and disposal of articles in use**

Comment:

These topics have been analysed in 3.3.2, 3.3.4 and 3.3.8 subchapters.

### **3.3.11. Strategy: identification of contaminated sites (Annex A, B and C chemicals) and remediation in an environmentally sound manner**

Explanation:

Remediation of the highly contaminated waste dumps, illegal deposits are part of the National Environment Remediation Program (OKKP). In the turn of considering contaminated sites, this program takes into account these deposits as well. The list of the pollutants contains also the regulated POPs.

In addition an assessment of communal and of illegal waste deposits of the country was carried out in 2002-2003 with the technical (foreign experts) and financial assistance of the PHARE program. Surveys, sampling from holes drilled for this purpose and analyses of the samples led to the conclusion, that *no POP containing hazardous wastes (residues of pesticides, PCB containing oils, etc.) worthwhile to mention can be found actually on the communal waste landfills, illegal deposits of the country.*

Nevertheless, the programme of OKKP will focus first of all the remediation of the **most substantial contaminated sites** (former military camps, etc.) of the country and has a separate state budget as a program of enhanced importance.

Thus, it is not practical to involve the OKKP in plans for reduction of POP emissions, first of all because it deals with “immission type” contaminations and not with emissions. Its

database “Kárinfo” contains relatively few actual data on POP contaminations, however some data were practically used for certain investigations (e.g. for searching pesticide residues).

**3.3.12. Activity: facilitating or undertaking information exchange and stakeholder involvement (Article 9 of SC)**

Comment:

The measure 3.3.1a. already contains the continuing work of the Inter ministerial Committee (IMC) in the future, too, in order to serve the information exchange. Actually the main tasks of the IMC are determined in the measure mentioned.

**3.3.13. Activity: public awareness, information and education (article 10 of SC)**

*Measures:*

a.) *Elaboration professionally sound, easy-to-understand information booklets for the general public on the characteristics and effects of POPs and on their elimination. The booklets will be disseminated by NGOs.*

*Responsible:* MEW (elaboration of the booklets)  
NGOs (dissemination)

b.) *Involvement of NGOs showing interest in the POP issue, asking for their participation in decision-making processes and in preparation of POP legislation and in the meetings of the Inter-ministerial Committee*

*Responsible:* MEW  
*Deadline:* ongoing

Explanation:

These measures aim actions on raising public awareness, furthermore the involvement of the “green” NGOs in the information, education, etc.

Taking into account that the POPs are the most toxic pollutants, and comes in the human body mainly by the food chain, it is very important to inform the population – reasonable through the NGOs – on the health and environmental effects of the POPs. These purposes will be achieved by the drafting and distribution of the easy-to-understand booklets, brochures mentioned in the measures above.

### 3.3.14. Activity: effectiveness evaluation (article 16 of SC)

*Comment:*

Basis of the effectiveness evaluation are *comparable monitoring data and reports* of the Parties submitted to the Secretariat of SC. Effectiveness of the provisions of SC and the NIP can be verified by providing data on the presence of POP substances listed in the Annexes of the SC.

The Conference of the Parties is dealing currently with the drafting of the unified questionnaire to be filled and provided for the Secretariat by the Parties. More details in the next subchapter.

### 3.3.15. Activity: reporting

*Measure:*

*Regularly reporting the data / information required by the international agreements and by the EU Regulation.*

*Responsible:*

*MEW (emission data), MH, MARD*

*Deadlines:*

*Annex A and B of SC: yearly*

*Annex C (release of uPOPs) of SC: acc. to Decision of COP-2/30 by the end of the year being Party of the SC, then in every four year*

*Remark:*

according to the reporting obligation of the Parties, data on the production and use of the Annex A and B compounds (mainly pesticides) should be reported annually. These data will be provided by the background institutions of the MARD (pesticides) and MEW (PCB in the equipments). The MEW is responsible in compilation of the emission releases of POPs to air, waste and water in every four year according to the Decision of COP –2/30.

### 3.3.16. Activity: research, development and monitoring (article 11 of SC)

*Measure:*

*To develop common point of views on optional amendment(s) of the SC, on listing of new chemicals and on expansion of control to new POP containing articles*

*Responsible:*

*MEW (also for co-ordination), MH, MARD, MF*

*Deadline: case by case*

**Remark:**

The present state of R&D, monitoring, measurements and infrastructure of POP issues in Hungary were analysed in subchapter 2.3.10 detailed. Main conclusion has been that the necessary technical infrastructure for the measurements (accredited laboratories), for the handling and disposal capacity (incinerators) of POPs are available. Only the measure above means new task to be carried out additionally.

**3.4. Priorities, resource requirements and conclusion**

The main priorities of the Hungarian NIP are in fully compliance with the need to meet the obligations of the SC.

The four high priority measures of the NIP are, as follows:

- clean-up the country from obsolete pesticide residues (with or without POP content);
- environmentally safe disposal of equipments filling with oils of PCB content;
- producing measurements data on the unintentionally generated POP releases into air, water and in POP residues as hazardous waste;
- application of BATs and BEPs at the industrial technologies.

*The appr. incremental costs of the execution of the NIP during the next 5 years consist of the following items according to the activities listed in chapter 3.3:*

<i>Measure</i>	3.3.2 a) and b) :	3 million USD	<i>Source:</i> state budget
	3.3.4 c)	3 mil.	enterprises (private sector)
	3.3.7 a)	0.2 mil.	state budget
	3.3.7 d)	16 mil.	enterprises (private sector)
	3.3.8	0.5 mil.	owners (private)
	and	0.3 mil.	state budget or intl. subs.
	<b>Total:</b>	<b>23 million USD</b>	

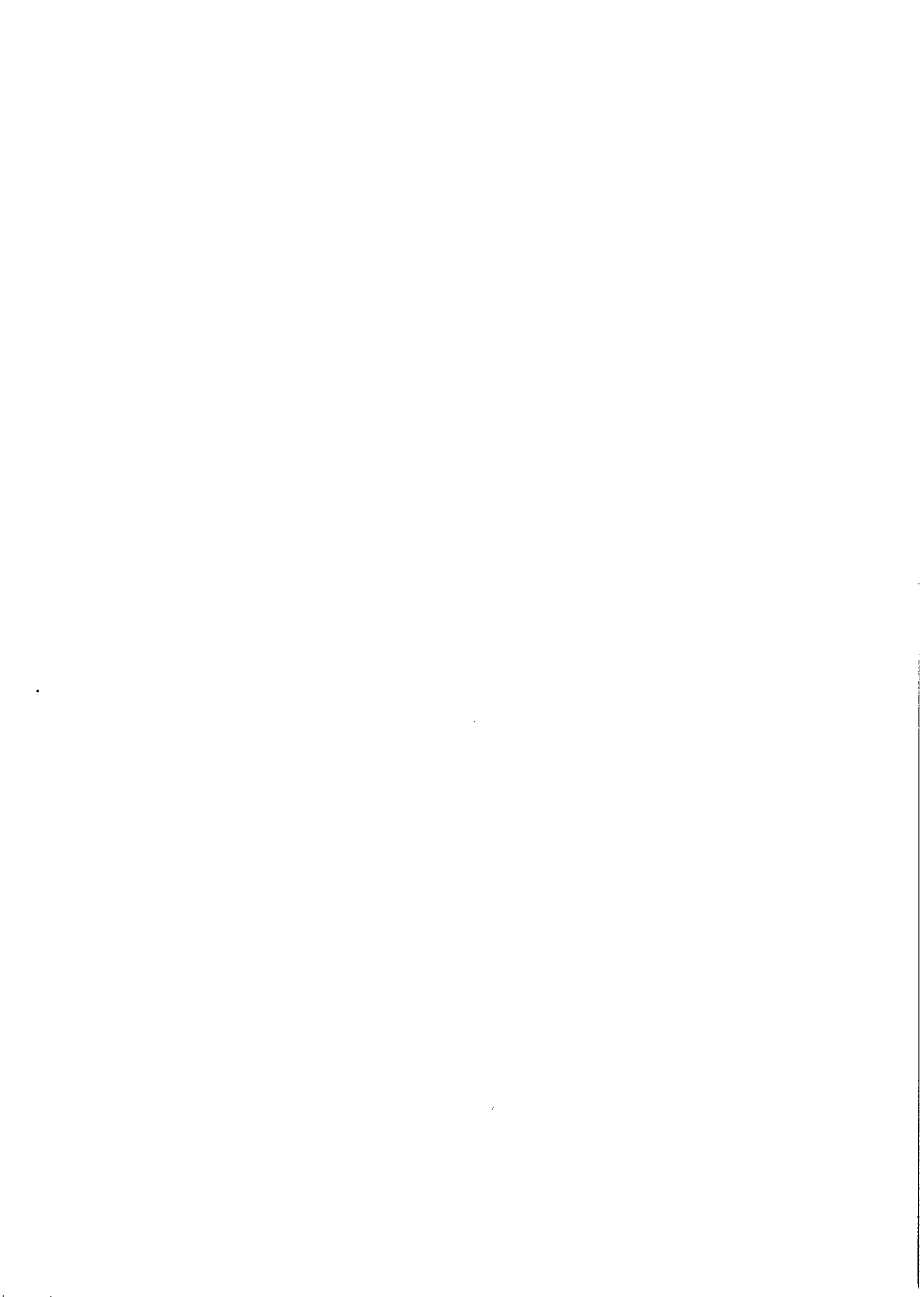
Taking into account also the uncertainties, the **total incremental cost of the measures of the NIP amounts about 20-25 million USD.**

However the largest part of it represents the financial contribution of the private sector, because they should cover the investment costs for the introduction of the BATs and BEPs

within their plant in order to minimize the POP releases of the technologies applied. It sums about 16 million USD alone in the next five year.

**General conclusion: Hungary adopted already all the provisions of the Stockholm Convention, thus no need for any further legislative step to meet the prescriptions of the SC. However the fulfilment of the measures outlined are necessary to reduce the POP load in the human and in the environment. Hungary is fully committed to perform the planned activities of the NIP.**

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## **ANNEX 1**

### **Revised PCDD/PCDF emission inventory of 2004**

**attached as separate Excel file "Annex 1- 2004 D-F ENG"**

Cat	Subcat	Classes	Sub-categories	Potential Release Route (µg TEQ/t)			Production t/a	Annual release						
				Air	Water	Land		g TEQ/a Air	g TEQ/a Water	g TEQ/a Land	g TEQ/a Product	g TEQ/a Residue		
6	a	1 2 3 4	Open Burning Processes Fires/burnings - biomass Forest and brushwood accidental fires * Grassland and moor fires Agricultural residue burning (in field), impacted, poor combustion conditions Agricultural residue burning (in field), not impacted	1	ND	4	NA	ND	0	10,000	0	0,000	0	0
				5	ND	4	NA	ND	0,000		0,000		0,000	
				30	ND	10	NA	ND	0,000		0,000		0,000	
				0,5	ND	10	NA	ND	0,000		0,000		0,000	
6	b	1 2 3 4 5	Fires, waste burning, landfill fires, etc. (industrial fires, accidental fires) Landfill fires Accidental fires in houses, factories Uncontrolled open burning of domestic wastes, garden wastes, grass, leaves, etc. ** Accidental fires in vehicles (per vehicle) Open burning of wood (construction/demolition) Open Burning Processes	1	000	600	NA	600	27,188	0	54,375	0	0	0
				400	ND	400	NA	400	0,000		0,000		0,000	
				300	ND	600	NA	600	27,188		54,375		0,000	
				94	ND	18	NA	18	0,000		0,000		0,000	
				60	ND	10	NA	10	0,000		37,188		54,375	

Releases in Sub-category 6b (classes 2-5) may be assigned as release to land or as release in residues, depending on local circumstances

\* EF is 1 ugTEQ/inhabitant multiplied by 10 million (population of Hungary); estimate by TNO in its report on the Dioxin emission in Candidate Countries, March 2005, assigned by EC

\*\* Source of activity (production) data: CEPMEIP database (2000-2003) = Co-ordinated European Programme on Particulate Matter Emission Inventories



## **ANNEX 2**

### **Inventory on atmospheric HCB, PCB and PAH emissions of 2004**

**attached as separate Excel file “Annex 2 – 2004 HCB-PCB-PAH ENG”**



### Annex 3

*Measurements of PCDD/PCDF releases to the atmosphere with special regard to some critical metallurgical processes and to the use of biomass (wood and wood wastes) in power plants*

*(results of the measurements carried out in 2005 by VITUKI, details of the report)*

Description of the technologies applied	Name of the company, place of the measurement	Volume of the sample (Nm <sup>3</sup> in 6h)	PCDD/PCDF in the sample (ng in 6h)	Concentration (ng/m <sup>3</sup> )	Production in 2005 (ton/a)	Emission in 2005 (g/a)	Emission factor (µg/ton)
Iron ore sintering, flue gas treatment by multi-cyclone	Dunaferr Co., Dunaújváros	6,8	8,2	1,20	1.000.000	1,46	1,46
Iron ore sintering using hazardous wastes, oil contaminated materials, etc.	Borsodi Érc, Ásvány- és Hulladékhasznosító Mű, Sajókeresztúr	7,8	28	3,6	21.000	1,69	80,6
Secondary aluminium production	Hungarian Aluminium Co. (MAL), Ajka	8,28	261,9	31,62	10.440	2,265	217
Secondary copper production	Csepeli Fémmű Rt. (Csepel Metal Co.), Csepel, Budapest	7,72	0,36	0,047	5.500	0,0152	2,76
Power plant with biomass (wood, etc.) combustion, electrofilter precipitation	AES Borsodi Erőmű Kft. (Borsod Power Plant Co. Ltd.), Kazincbarcika	5,9	0,075	0,013	354.500	0,014	0,04

## **ANNEX 4**

### **Measurement of dioxin emission in the district of Northern Hungarian Environmental Inspectorate in 2005**

**attached as separate Excel file “Annex 4 –Dioxin mérések ÉMI KÖFE ENG”**

## Annex 4

### Measurements of dioxin emission in the district of North Hungarian Environm. Inspectorate in 2005

Companies	Sampling labor. Analysis labor.	Date of measurement	Production [t/h]	Volume flow [m <sup>3</sup> /h]	Conc. of PCDD/DF [ng/m <sup>3</sup> ]	
					measured	calculated
Power Plant Mátra Co., Visonta	ÉMI KTVF VITUKI KHT	2005.04.19	1 200	3 000 000	0,0170	0,0212
Power Plant Mátra Co., Visonta	ÉMI KTVF Bálint Analitika Kft.	2005.09.13	1 200	3 500 000	0,0026	0,0033
ÉMK Ltd., Sajóbábony	ÉMI KTVF Bálint Analitika Kft.	2005.06.29	0,93	9 439	0,0740	0,1209
Borsodkom Ltd., Sajóbábony	ÉMI KTVF Bálint Analitika Kft.	2005.07.06	0,22	4 311	0,0750	0,0711
Cement Factory HOLCIM Co., Miskolc	ÉMI KTVF Bálint Analitika Kft.	2005.06.29	173	229 558	0,0030	0,003
Ecomissió Ltd., Tiszaújváros	Környezettechnológia Kft. Fővárosi ANTSZ	2005.10.27	1,03	10 398	0,0370	0,0480
MOL Co. TIFO, Tiszaújváros	Bálint Analitika Kft. Bálint Analitika Kft.	2005.03.04	0,66	14 077	0,0038	0,0053

# Annex 5

## Table A

*Measurement of atmospheric POP emissions of metallurgical technologies in 2006  
Sampling and results (carried out by VITUKI Co.)*

Technologies and companies concerned	Prod. (t/h)	Volume of the sample (Nm <sup>3</sup> )	PCDD/F			PCB			PAH			HCB			O <sub>2</sub> (vol. %)
			Quant. in the sample (ng)	Conc. (ng/m <sup>3</sup> )	Emiss. factor (µg/t)	Quant. in sample (ng)	Conc. (ng/m <sup>3</sup> )	Emiss. factor (µg/t)	Quant. in the sample (ng)	Conc. (ng/m <sup>3</sup> )	Emiss. factor (µg/t)	Quant. in the sample (ng)	Conc. (ng/m <sup>3</sup> )	Emiss. factor (µg/t)	
Iron- and steel industry (foundries), Eurometal Ltd.	4,825	4,9	0,55	0,11	0,35	17545	3580,6	11317							9,67
Iron- and steel industry (foundries), Wescast-Hungary Ltd.	8,164	7,2	0,22	0,03	0,40	182,3	25,3	331,8							20,78
Iron- and steel industry, sintering, Dunafer Co., Dunaújváros	155,7	5,3	6,46	1,22	1,67	827,4	156,1	214,0	3275	617,9	846,9				17,5
Iron- and steel industry, sintering, BÉM Co., Sajókeresztúr	19,5	4,4	6,66	1,51	24,8				18199	4136	67872				20,33
Easteel production, DAM, Diósgyőr	63,6	8,2	1,63	0,20	0,66	1287,6	157,0	516				310,5	37,9	124,4	20,38
BOF steel production, Dunafer, Dunaújváros	218,5	7,5	6,42	0,86	0,66	82,7	11,0	8,4				153,8	20,5	15,7	12,2
Non ferrous metal production, secuder aluminium production, MAL, Ajka	1,7	7,6	11,1	1,46	6,6	1498,5	197,2	893,1				3370,8	443,5	2009,0	16,08
Non ferrous metal production, sec. copper prod., Csepel, Bp.	2,1	9,5				3187,9	335,6	3004,0				139,0	14,6	131,0	20,88

# Annex 5 (cont'd)

## Table B

*Measurement of atmospheric POP emissions of metallurgical technologies in 2006  
Annual production data, emission factors based on measurements and annual emissions*

Technologies and companies concerned (identical with Table A)	Production in 2006 (t)	PCDD/F		PCB		PAH		HCB	
		µg/t	g/a	µg/t	g/a	µg/t	g/a	µg/t	g/a
Iron- and steel industry (foundries), Eurometal Ltd.	18794	0,35	0,0066	11317	212,7	-	-	-	-
Iron- and steel industry (foundries), Westcast-Hungary Ltd.	49700	0,4	0,02	331,8	16,5	-	-	-	-
Iron- and steel industry, sintering, Dunaferr Co., Dunaújváros	1107546	1,67	1,85	214,0	237,0	846,9	938,0	-	-
Iron- and steel industry, sintering, BÉM Co., Sajókeresztúr	30213	24,8	0,75			67872	2050,6	-	-
EA steel production, DAM, Diósgyőr	163278	0,66	0,11	516,0	84,2	-	-	124,4	20,3
BOF steel production, Dunaferr, Dunaújváros	1650184	0,66	1,1	8,4	13,9	-	-	15,7	25,9
Non ferrous metal production, secuder aluminium production, MAL, Ajka	13122	6,6	0,087	893,1	11,7			2009,0	26,4
Non ferrous metal production, sec. copper prod., Csepel, Bp.	4600			3004	13,8	-	-	131,0	0,6
			3,92		589,8		2988,6		73,2

**Annex 6**  
**Table A**

*POP content of solid and liquid by-products (sludge, flying ash, desulphurisation unit, waste water) generated by high temperature technologies (VITUKI Co., 2005)*

*Concentration of POP compounds in the samples*

Companies	Sludge [ $\mu\text{g}/\text{kg}$ ]				Flying ash [ $\mu\text{g}/\text{kg}$ ]				Desulphurisation unit [ $\mu\text{g}/\text{kg}$ ]				Waste water [ $\mu\text{g}/\text{l}$ ]			
	PCDD/F	PCB	PAH	HCB	PCDD/F	PCB	PAH	HCB	PCDD/F	PCB	PAH	HCB	PCDD/F	PCB	PAH	HCB
Solid waste incineration Co., Bp.	nd	1,69	141	2,56	0,0071	nd	14	nd	0,117	nd		10,8	-	-	-	-
ONYX hazardous waste incineration Co., Dorog	nd	1,05		2,90	3,19	nd	83,2	89,8	-	-		-	-	-	-	-
Hazard. waste incinerator, Győr	0,006	nd	46*	nd	0,31	0,67	3,65	15,1	0,95	nd	103*	138	-	-	-	-
Power Plant Vértes, Oroszlány	-	-	-	-	0,0005	0,82		1,48	-	-		-	$5 \cdot 10^{-6}(\text{y})$	-	-	-
Power Plant Mátra, Visonta	$1,6 \cdot 10^{-7}$	0,96		4,12	$1,8 \cdot 10^{-7}$	nd		nd		nd	5,9	nd	-	-	-	-
Power Plant Pannon, Pécs	0,003	nd	264	nd	0,003	nd		nd	-	-		-	-	-	-	-
Power Plant Borsod, Kazincbarcika	-	-	-	-	0,0004	nd	33,6	nd	-	-		-	-	-	-	-
Power Plant Bakony, Ajka	-	-	-	-	0,003	nd		nd	-	-		-	-	-	-	-
Rába Motor Works, Győr	-	-	-	-	0,08	0,93	15100	nd	2,4	6,06	8230	1,54	-	-	-	-
Iron foundry, Mohács	-	-	-	-					-	-		-	-	-	-	-
Pig iron, Dunaferr Ferromark	-	-	-	-	0,022(y)	-	-	-	-	-	-	-	$1,8 \cdot 10^{-7}$	nd	-	-
Coke production, Dunaferr DBK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	5,57	-

„nd” = measured but not detected

„y” = can not be released to the environment



Annex 6 (cont'd)  
Table B

Annual release of POPs to the environment

Companies	Sludge [g/a]				Flying ash [g/a]				Desulphuration unit [g/a]				Waste water [g/a]			
	PCDD/F	PCB	PAH	HCB	PCDD/F	PCB	PAH	HCB	PCDD/F	PCB	PAH	HCB	PCDD/F	PCB	PAH	HCB
Solid waste incineration Co., Bp.	n	71	5922	108	0,0447	n	88,2	n	0,688	n	n	63,4	-	-	-	-
ONYX hazardous waste incineration Co., Dorog	n	2,95	n	8,15	11,3	n	293	317	-	-	-	-	-	-	-	-
Hazard. waste incinerator, Győr	0,013	n	101	n	0,16	0,34	1,83	7,55	0,057	n	6,18	8,28	-	-	-	-
Power Plant Vértes, Oroszlány	-	-	-	-	0,501	822	n	1483	-	-	-	-	-	-	-	-
Power Plant Mátra, Visonta	0,00004	211	n	906	0,000225	n	n	n	-	n	2655	n	-	-	-	-
Power Plant Pannon, Pécs	0,009	n	792	n	0,012	n	n	n	-	-	-	-	-	-	-	-
Power Plant Borsod, Kazincbarcika	-	-	-	-	0,0014	n	118	n	-	-	-	-	-	-	-	-
Power Plant Bakony, Ajka	-	-	-	-	0,0025	n	n	n	-	-	-	-	-	-	-	-
Rába Motor Works, Győr	-	-	-	-	0,00024	0,0028	45,3	n	0,0065	0,016	22	0,004	-	-	-	-
Iron foundry, Mohács	-	-	-	-	n	n	n	n	-	-	-	-	-	-	-	-
Pig iron, Dunaferr Ferromark	-	-	-	-	-	-	-	-	-	-	-	-	0,00008	n	-	-
Coke production, Dunaferr DBK	-	-	-	-	-	-	-	-	-	-	-	-	-	-	1620	-

„n” = neglectible, can not be calculated from the measured data

**Accredited laboratories for sampling and analysis  
of dioxins and furans in Hungary**

***Accredited laboratories for sampling of PCDD / PCDF:***

1. VITUKI Kht. Budapest. XI. Aga u. 3.
2. University of Technics and Economy of Budapest, Dept. of Chemical Analysis
3. Environmental Inspectorate of Northern Transdanubia, Győr
4. Env. Inspectorate of Middle Transdanubia, Veszprém
5. Env. Inspectorate of Northern Hungary, Miskolc
6. Environmental Technologies Ltd. Co., Budapest

***Accredited laboratories for analysis of PCDD / PCDF emissions:***

1. VITUKI Co. Budapest, XI. Aga u. 3.– HRGC/HRMS equipment
2. Fodor József OKK, Central Chemical Laboratory, Budapest –  
HRGC/HRMS equipment;
3. ÁNTSZ Budapest Municipal Institute, Budapest
4. Bálint Analitika Co. Ltd., Budapest
5. Central Laboratory for National Qualification of Agriculture Issues, Budapest
6. University of Technics and Economy Budapest, Dept. of Chemical Analysis –  
HRGC/HRMS equipment;
7. Dr. E. Wessling Chemical Laboratory Co. Ltd., Budapest

**Final Report**  
**on**  
**Amendment No. 3 to the Contract of**  
**Enabling Activities To Facilitate Early Action On The Implementation**  
**Of The Stockholm Convention On Persistent Organic Pollutants (POPs)**  
**In Hungary**

*Additional measurements of POP releases and workshop held for the  
environmental inspectors on the best available techniques*

**UNIDO Project No.: GF/HUN/01/005**

*Ministry of Environment and Water of Hungary*  
*Budapest, 28<sup>th</sup> June 2007*

*Final Report*  
*On Activity No. 1 and Activity No. 2 of the TOR*  
*Of Amendment No. 3 of the Project GF/HUN/01/005*

**1. Objective of Activity No. 1 and Activity No. 2 of the Amendment No. 3 of the Project:**

- additional sampling and analysing of the uPOP emissions in order to obtain reliable measurement results on the unintentional POP releases of power plants in Hungary;
- workshop held for the environmental inspectors on the relevant POP BATs and BEPs, furthermore evaluation of the measurements of POP releases.

**2. Background:**

- there is no emission limit values enforced by the international regulations for the uPOP emissions of power plants, therefore the operators are not obliged to report the amount of these releases;
- in lack of emission limit values for POP releases of power plants in the EU, the environmental inspectors should be able to control the BATs and BEPs applied by the operators.

**3. Introduction:**

- The POP inventory constitutes the basis of the action of the National Implementation Plan (NIP). Therefore the reliability of the inventory has paramount importance. The only unintentional POP emission data of the power plants measured in 2005 can not considered sufficient enough to assure reliability of the emission data of the sector. In addition, technological changes have been introduced at some of the plants. Therefore two further measurements were performed at each power plant.
- The results of the measurements of POP releases, its evaluation and the relevant BATs and BEPs were discussed and presented for the representatives of the 10 environmental inspectorates of Hungary on a workshop held on 27<sup>th</sup> June 2007.

**4. Description of the activity No. 1: Sampling and analysis were executed at the following power plants twice: in May and June 2007.**

*Table 1.* summarizes the places of sampling, the kind of sample and the measured pollutant:

Power Plant	Emission to air		Release to technological waste	
	PCDD/PCDF	PCB	PCDD/PCDF	PCB
Bakony Power Plant (biomass)	+	+	-	fly ash/slurry
Borsod Power Pant (biomass)	+	+	-	slag
Pannon Power Plant (biomass)	+	+	-	-
Mátra Power Plant (lignite)	+	+	-	-
Vértes Power Plant (coal)	+	+	fly ash/slurry	-

### **Bakony Power Plant (biomass)**

Technology: from the originally pulverized-coal burning furnaces two were converted to chopped wood burning furnaces. Electro filters perform the purification of the waste gas. The generated heat is converted to electricity.

Sampling conditions: Sampling and measurements were executed at the 12. furnace in a section after the electro filter and before the junction point to the chimney, under average undisturbed operation conditions.

Date of sampling: 24. 05. 2007 and 13. 06. 2007

### **Borsod Power Pant (biomass)**

Technology: from the originally pulverized-coal burning furnaces two were converted to biomass (chopped wood, sawdust) burning furnaces in 2002-2003. In case of biomass with low heating value few percentage of coal is added to the fuel.

The purification of the waste gas is performed by the electro filters adequately redesigned and rebuilt for the new operation conditions and requirements. The generated heat is converted to electricity.

Sampling conditions: Sampling and measurements were executed at the furnace in a section after the electro filter and before the junction point to the chimney, under average undisturbed operation conditions.

Date of sampling: 10. 05. 2007 and 31. 05. 2007

### **Pannon Power Plant (biomass)**

Technology: The appropriately sized chopped wood is burnt on quartz sand fluid bed in the furnace. The solid matters (mostly ash, fly ash) outgoing with the waste gases are separated by electro filters.

Sampling conditions: Sampling and measurements were executed in a section after the electro filter and before the junction point to the chimney, under average undisturbed operation conditions.

Date of sampling: 16. 05. 2007 and 11. 06. 2007

### **Mátra Power Plant (lignite)**

Technology: ground lignite is burnt in special pulverized-coal burner. In case of low heating value additional oil is burnt. The generated heat energy is transformed to electrical energy.

The waste gases of the five furnaces are collected in a common duct after the electro filter, then the homogenized gas is distributed in two equal portion for the two desulphurizers.

One portion of the fly ash separated on the electro filter is utilized (for example in cement production), the rest with the slag-slurry is transferred into the thick slurry mixer. In the mixer a 1/1 solid /water ratio is adjusted and the mix is transferred to the slurry lake.

The unutilized portion of the gypsum also transferred into mixer, then to the slurry lake.

Sampling conditions: Sampling and measurements of the desulphurized waste gas were executed at the sampling area of the control instruments built in the chimney, under average undisturbed operation conditions.

Date of sampling: 09. 05. 2007 and 01. 06. 2007

### **Vértes Power Plant (brown coal)**

Technology: Dried and ground mixture of various quality brown coals is burnt in furnaces.

In case of low heating value additional oil is burnt. The waste gases are introduced into the environment after multi-stage dust separation and desulphurization. The slag from the furnace, the separated but not utilized portion of the fly ash and the gypsum generated in the desulphurizer collected at the slurry lake.

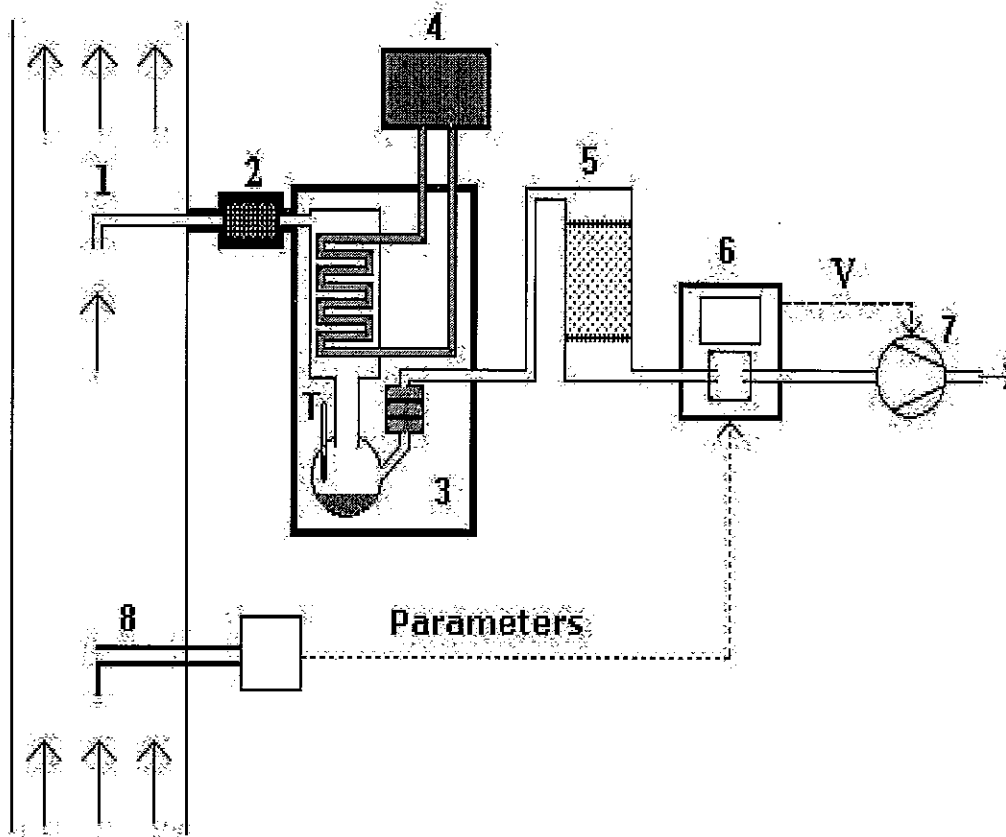
Sampling conditions: sampling and measurements of the desulphurized waste gas were executed at the sampling area of the control instruments built in the chimney, under average undisturbed operation conditions.

Date of samplings: 03. 05. 2007 and 23. 05. 2007

## 5. Measuring methods

### Sampling of POPs

Sampling was executed according to MSZ-EN 1948-1:2006 standard. Figure 1. shows the schematic diagram of the sampler:



1. Titanium sucking pipe for isokinetic sampling
  2. Heated probe with inner glass fibre filter socket
  3. Thermally insulated, cooled field with spiral condenser, trap for condensates, glass fibre spray catcher and XAD-adsorber ( $T_{\max}=18^{\circ}\text{C}$ )
  4. Cooler
  5. Silica gel packed drying column
  6. Kálmán System KS-404 measuring and controlling unit with calibrated mass volume gauge
  7. Frequency controlled pump
  8. Temperature and pressure measurement in the waste gas tunnel
- V: Pump controlling signal
- Parameters feed into the controlling unit:
- temperature of the waste gas in the tunnel
  - dynamic and static pressure of the waste gas in the tunnel
  - density of waste gas in normal state

## **6. Analysis of POPs**

The analysis of PCDD/PCDF, PCB, and HCB from emission samples were executed according to the following standards:

MSZ 1484-6

MSZ 1484-11

MSZ 21470-98

MSZ EN 1948-2,3

PCDD/PCDFs were measured by HRGC/HRMS, while PCBs and HCBs were determined using regular GC/MS.

## **7. Results of the measurements:**

The sampling and analytical data are collected in Table 2.-3. The production data and the annual POP emission data are collected in Table 4.-5.



Table 2. Sampling and analysis data of the first sampling series

Power Plant	MW, fuel t/h	Sample size Nm <sup>3</sup>	PCDD/F			PCB			Residue HCB Concentration	O <sub>2</sub> (vol%)
			Quantity (ng)	Concentration (ng/m <sup>3</sup> )	Emission fact. µg/MWh, µg/t	Quantity (ng)	Concentration (ng/m <sup>3</sup> )	Emiss. factor µg/MWh, µg/t		
Vértes Power Plant, Oroszlány	183 MW 194 t/h	5,4	0,041	0,0076	0,05	12,26	2,27	14,7	< 0,002 µg/L Slurry	10,8
			0,046					13,7		
Mátra Power Plant, Visonta	399 MW 587 t/h	6,01	0,005	0,00084	0,0037	65,25	10,86	49,1	0,117 µg/kg Slag, fly ash, gypsum	10,37
			0,0025					32,9		
Pannon Power Plant, Pécs	49,9 MW 50,7 t/h	4,3	0,005	0,0012	0,0058	12,85	3,00	14,4		7,3
			0,0057					14,2		
Borsod Power Plant, Kazincbarcika	19,0 MW 25,6 t/h	6,06	0,119	0,02	0,14	24,91	4,11	29,2	Residue PCDD/F Concentration	14,2
			0,10					21,7		
Bakony Power Plant, Ajka	21,2 MW 21,8 t/h	6,5	0,018	0,003	0,031	38,4	5,91	60,2	0,041 µg/kg fly ash	14,7
			0,030					58,6		

Table 3. Sampling and analysis data of the second sampling series

Power Plant	MW, fuel t/h	Sample size, Nm <sup>3</sup>	PCDD/F			PCB			Residue (HCB) Concentration	O <sub>2</sub> (vol%)
			Quantity (ng)	Concentration (ng/m <sup>3</sup> )	Emission fact. µg/MWh, µg/t	Quantity (ng)	Concentration (ng/m <sup>3</sup> )	Emission factor µg/MWh, µg/t		
Vértes Power Plant, Oroslány	161 MW	6,7	0,097	0,014	0,095	7,33	1,09	7,4	<0,002 µg/L slurry	9,3
	157 t/h		0,101	0,015	0,045	9,45	1,37	4,1		
Mátra Power Plant, Visonta	841 MW	6,9	0,128	0,027	0,130	16,44	3,50	16,8	0,393 µg/kg Slag, fly ash, gypsum	7,82
	1129 t/h		0,020	0,004	0,117	19,64	3,51	15,2		
Pannon Power Plant, Pécs	49,9 MW	4,7	0,043	0,006	0,044	83,9	11,82	87,4	Residue (PCDD/F)	7,4
	55,4 t/h		0,043	0,006	0,044	83,9	11,82	85,9		
Borsod Power Plant, Kazincbarcika	19,4 MW	5,6	0,043	0,006	0,044	83,9	11,82	87,4	Concentration	13,9
	26,1 t/h		0,043	0,006	0,044	83,9	11,82	85,9		
Bakony Power Plant, Ajka	21,9 MW	7,1	0,043	0,006	0,044	83,9	11,82	87,4	0,048 µg/kg fly ash	12,6
	22,3 t/h		0,043	0,006	0,044	83,9	11,82	85,9		

**Table 4. Production and POP emission data of the first sampling series**

Power Plant	Production MWh/year	POP emission g/year		POP in residue g/year	
		PCDD/F	PCB	PCDD/F	HCB
Vértés Power Plant, Oroszlány	1525690	0,08	22,4	-	nd
Mátra Power Plant, Visonta	5621000	0,021	276,0	-	201,0 slag
Pannon Power Plant, Pécs	336800	0,002	4,8	-	-
Borsod Power Plant, Kazincbarcika	162860	0,023	4,8	-	-
Bakony Power Plant, Ajka	193530	0,006	11,6	0,08 Fly ash+ slurry	-

**Table 5. Production and POP emission data of the second sampling series**

Power Plant	Production MWh/year	POP emission g/year		POP in residue g/year	
		PCDD/F	PCB	PCDD/F	HCB
Vértes Power Plant, Oroszlány	1525690	0,145	11,6	-	nd
Mátra Power Plant, Visonta	5621000	0,34	30,9	-	678,0 slag
Pannon Power Plant, Pécs	336800	0,04	5,7	-	-
Borsod Power Plant, Kazincbarcika	162860	0,005	4,2	-	-
Bakony Power Plant, Ajka	193530	0,008	16,9	0,09 Flay ash+ slurry	-

## **8. Report on the workshop held for the inspectorates, evaluation of the measurements, results of the workshop**

As Activity No. 2 of the TOR of Amendment 3 of the UNIDO contract, a workshop was organized for the environmental inspectors on 27<sup>th</sup> June 2007 in the Ministry.

At least two inspectors of each inspectorate dealing with the BATs and the invited industrial experts as presenters attended the workshop, altogether 31 persons. The presentations focussed on successfully implemented POP BATs in Hungary and on the tasks to be carried out by the inspectorates in course of the implementation of the NIP.

*The measurements of POP releases of the five power plants* presented in the Tables 2.-5. convinced the participants of the workshop, that the POP emission of the power plants investigated is low. If we take into account also the results of the first POP measurements serie in 2005, altogether three complete measurement series of the same power plants are available. This is a reliable database for the evaluation of the POP releases of this POP emitting source if the results are similar to each other.

Especially the PCDD/DF and the PCB concentration of the three power plants with biomass combustion (Pannon, Borsod and Bakony) are very low (Table 2 and 3). However, also the brown coal fuelled Vértés and the lignite fuelled Mátra power plants represent low dioxin and PCB concentration in waste gases and in the residues as well. As comparison serves the emission limit value (ELV) 0,1 ng/Nm<sup>3</sup> for PCDD/DF of the waste incineratons.

*Result of the measurements:*

all of the PCDD/DF concentrations of the twice five samplings of the five power plants are lower than that of the strict ELV of the waste incineration above.

According to the opinion of the attendants, the general reconstruction of power plants (desulphurizing equipm., fabric filter, fluegas treatment, etc.) carried out in the period 2000-2004 caused this promising result. The workshop concluded, that currently **further measurements of the POP releases of power plant sector is needless, and should be focussed to the sampling and analysis of POP emission of the metallurgical industries.**

After change of opinions among the inspectors and presenters on the reporting duties of the operators to the inspectorates, the invited industrial experts entered into details of their experiences and advices on the practical introduction of BATs and BEPs.

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# **National Implementation Plan**

## **For the elimination and reduction of Persistent Organic Pollutants (POP)**

### ***A./ Activities to strengthen institutional background***

1. Continuing the activity of the Inter-ministerial Committee (IMC) for the information exchange, for the discussion of the actions on the expert level, to harmonize the tasks concerning two or more ministries, the regulation of the new chemicals, and for periodical control of measures taken.
2. Regular training on annual conferences for Inspectors of the authority in the first instance, about the changes on the regulation regarding POP releases, controlling tasks, and on application of Best Available Techniques (BAT's), especially on technologies listed on the II and III part of the Annex "C" of the Stockholm Convention.

### ***B./ Activities regarding PCBs and PCB containing articles / equipments***

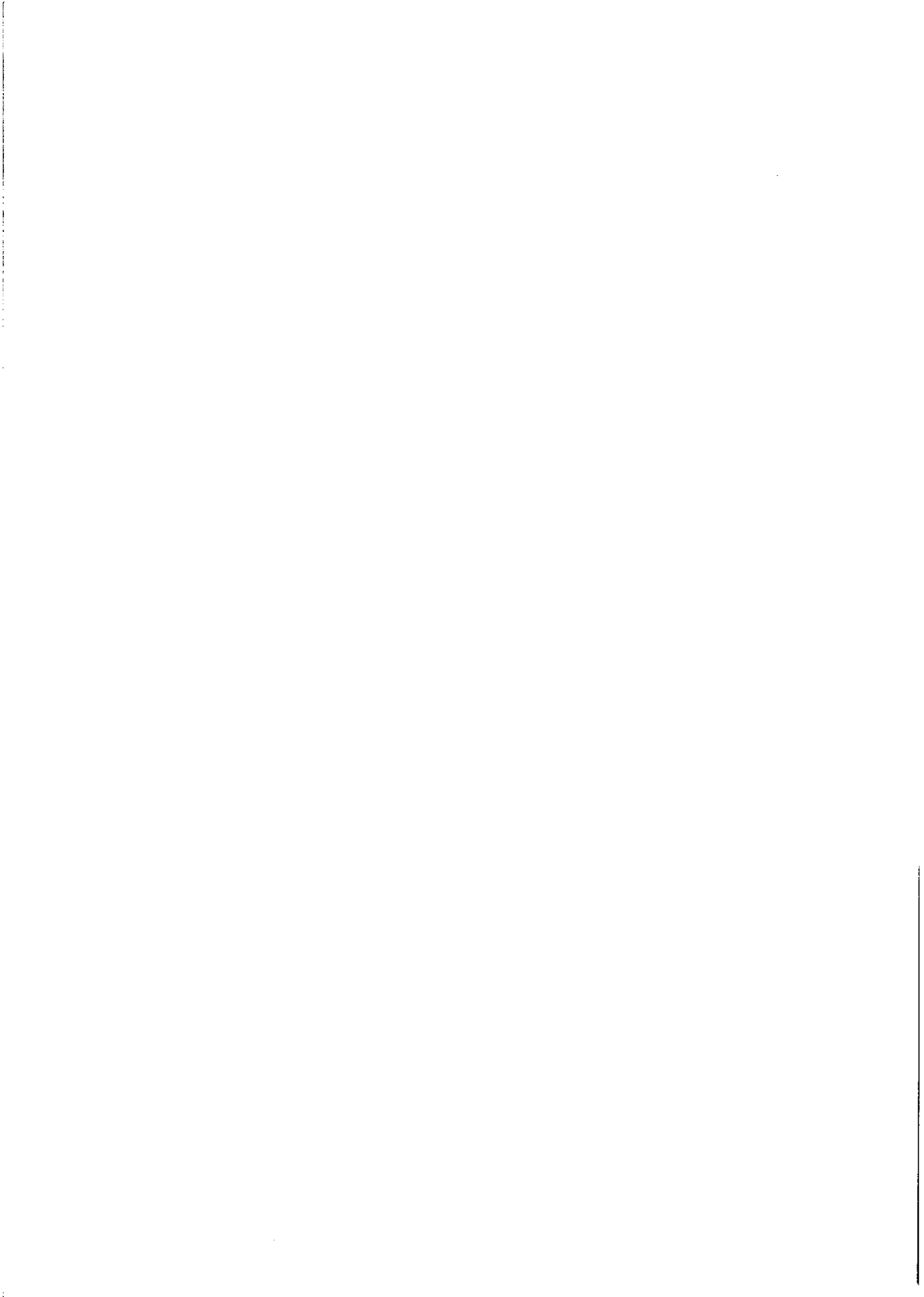
1. Cleaning and optional utilization of the housing of the equipment and destruction of PCB contents has to be finished by 31st of December 2010., regarding to the 5/2001 (II.23.) MEW decree on the detailed regulations of the treatment of Polychlorinated biphenyls, and Polychlorinated terphenyls, and equipment containing them.
2. Checking the fulfillment of the measures in the first point is the responsibility of the Environmental Inspectorates as the authority in the first instance.

### ***C./ Activities to reduce unintentional POP releases, monitoring***

1. Measurements of emission concentration in samples from air, technological waste waters and residues of POP emitting industrial technologies and sources. Compilation of Measurement Plan, coordination of measurements, purchase of possible international financial resources.
2. Regarding to the measurements, evaluation the POP emissions of an industrial sector and taking the appropriate measures to introduce necessary steps (e.g. filtering, flue gas cleaning, etc.)
3. Translation of available POP BAT documents and elaboration of guidelines, furthermore extension of this activity to other POP emitting industrial technologies
4. Regular control of the introduction and implementation of POP-BATs by the enterprises by the Environmental Inspectorates.

### ***D./ Activities to reduce POP releases from obsolete stockpiles and wastes***

1. Cleaning of 14 counties (Békés, Borsod-Abaúj-Zemplén, Csongrád, Hajdú-Bihar, Heves, Nógrád, Szabolcs-Szatmár-Bereg, Jász-Nagykun-Szolnok, Baranya, Tolna, Fejér, Komárom-Esztergom, Győr-Moson-Sopron, Vas) not yet cleaned from pesticide wastes including wastes containing POPs, during the collecting and treatment actions.
2. The collection and final-treatment of the remaining 200 tons of obsolete pesticide waste in the Country is regulated by the 98/2001 (VI.15.) Governmental Decree on the terms and conditions of the treatment of hazardous wastes, but with the purchase of





possible international financial resources, and with a possible future regulation on the elimination of obsolete pesticide wastes could be done to encourage the process.

***E./ Actions on raising awareness, role of NGOs, information, education***

1. Elaboration of easy-to-understand information booklets for professional organizations, NGOs and the general public on the characteristics and effects of POPs and on their elimination.
2. Involvement of NGOs showing interest in the POP issue, in decision-making processes and in preparation of POP legislation.

***F./ Actions on reporting***

1. Regularly reporting to international organizations regarding to the requirements of International POP agreements and the 850/2004 EC Regulation.
2. Deadlines, see table 1.

<b>Content of the Report</b>	<b>Stockholm Convention</b>	<b>850/2004/EC Regulation</b>	<b>Aarhus Protocol</b>
Data on production and use of POP chemicals are banned as pesticides or industrial chemicals	Annual report to the Secretariat of the Stockholm Convention	Annual and three-yearly report (EU)	Annually until the 15th of Feb. On the second year after the reporting year
Unintentional emissions of Thermal-industrial activities: PCB, PAH, PCDD/DF and HCB emission releases data to air, water, soil, and joint analysis report	Regarding to COP-2/30. except PAHs when a country becomes party, and every four year after	Two years after the 1, § of Art, 6 of the EU-R come into force and than every three years	PCDD/DF, HCB and PAHs: annually until the 15th of Feb. On the second year after the reporting year on the common reporting format of CLRTAP

Table 1. Reporting obligations

***G./ Actions on research, development, and monitoring***

1. Build up a unified position with the convene of the Inter-ministerial Committee, in case of changes on the Convention, Protocol and the EC Regulation, on the decision of up taking of new chemicals to any of the international agreements, and on the regulation of any product, if they containing POPs.

