REPUBLIC OF TURKEY
MINISTRY OF ENVIRONMENT AND FORESTRY

NATIONAL IMPLEMENTATION PLAN

FOR THE STOCKHOLM CONVENTION
ON
PERSISTENT ORGANIC POLLUTANTS (POPs)

ANKARA

September 2010

Prepared by

1. ***Environment, Health, Pesticide Task Team***
   Coordinators Kemal Kurusakız, Dr. Meral Yeniova, Dr. Pelin Aksu and **Members**

2. ***PCB and PCB Containing Equipments Task Team***
   Coordinator Mehmet Düzgün and **Members**

3. ***Emission Research and Monitoring Task Team***
   Coordinator Dr. Sönmez Dağlı and **Members**

4. *Prof.Dr. Altan Acara (National Project Coordinator)*

Environment, Health, Pesticide Task Team

Kemal Kurusakız	**Dr. Meral Yeniova**	**Dr. Pelin Aksu**
Coordinator	Coordinator	Coordinator
Ministry of Environment and Forestry	Refik Saydam Hygiene Center Poison Research Department Ministry of Health	Ministry of Agriculture and Rural Affairs

Members
Neşe Çehreli (Ministry of Environment and Forestry)
Dr. Alev Burçak (Ministry of Agriculture and Rural Affairs)
Dr.Menekşe Keski (Ministry of Environment and Forestry)
Nur Ergin (Refik Saydam Hygiene Center Poison Research Department)
Ergün Cönger (Ministry of Agriculture and Rural Affairs)
Prof.Dr. Dürdane Kolankaya (Hacettepe Unıversity Faculty of Science Department of Biology)
Deniz Türkoğlu MD. (Refik Saydam Hygiene Center Poison Research Department)
Dr.Rukiye Doğanyiğit (Ministry of Environment and Forestry)
Kemal Kurusakız (Ministry of Environment and Forestry)
Prof.Dr. Altan Acara (National Project Coordinator)

2. PCB and PCB Containing Equipments Task Team

Mehmet Düzgün
Coordinator, Ministry of Energy and Natural Resource, EUAS
Members
Erol Albostan (Ministry of Energy and Natural Resource, TEDAS)
Hüseyin Çavdar (Ministry of Energy and Natural Resource, TEDAS)
Cemal İnce (Ministry of Energy and Natural Resource, TEDAS)
Nuri Kandemir (Ministry of Energy and Natural Resource, TEIAS)
M. Kemal Kumtepe (Ministry of Energy and Natural Resource, TEIAS)
N. Osman Çalışkan (Ministry of Energy and Natural Resource, BEDAS)
Yaşar Çetin (Ministry of Energy and Natural Resource, TEIAS)
Murat İlkkahraman (Ministry of Energy and Natural Resource, TEIAS)
Ayten Tuygun (Directory General for Turkish Electricity Generation and Transmission Corp.)
Dr.Menekşe Keski (Ministry of Environment and Forestry)
Dr.Rukiye Doğanyiğit (Ministry of Environment and Forestry)
Neşe Çehreli (Ministry of Environment and Forestry)
Kemal Kurusakız (Ministry of Environment and Forestry)
Prof.Dr. Altan Acara (National Project Coordinator)

3. Emission Research and Monitoring Task Team

Dr. Sönmez Dağlı
Coordinator, STRCT-MRC
Members
Fehim İşbilir (STRCT-MRC)
Kemal Kurusakız (Ministry of Environment and Forestry)
Dr.Menekşe Keski z (Ministry of Environment and Forestry)
Dr.Pelin Aksu (Ministry of Agriculture and Rural Affairs)
Taylan Kıymaz (State Planning Organization)
Derya Şahin (Ministry of Environment and Forestry)
İzaydaş A.Ş.
Türkiye Çimento Müstahsilleri Birliği
Donkasan
Kocaeli Sanayiciler Odası
Prof.Dr. Altan Acara (National Project Coordinator)

CONTENTS

Executive Summary 7
1 Introduction 10
1.1 Purpose of Turkey's National Implementation Plan (NIP) under the Stockholm Convention on Persistent Organic Pollutants (POPs) 10
1.2 POPs 11
1.2.1 Brief description of POPs 11
1.2.2 POPs are global issue 11
1.3 Stockholm Convention 12
1.3.1 Overview of the Convention 12
1.3.2 Overview of the 12 POPs 12
1.3.3 International Implementation 14
2.0 Country baseline 15
2.1 Country Profile 16
2.1.1 Geography and population 16
2.1.2 Economic and Political Profile 17
2.1.3 Profiles of Economic Sectors 18
2.1.4 Environmental Overview 18
2.2 Institutional, policy and regulatory framework 18
2.2.1 Environmental policy, sustainable development policy and general legislative framework 18
2.2.2 Roles and responsibilities of Ministries Agencies and other governmental institutions involved in POPs life cycles (from source to disposal, environmental fate and health monitoring) 22
2.2.3 Relevant International commitments and obligations 24
2.2.4 Description of existing legislation and regulations addressing POPs (manufactured chemicals and unintentionally produced POPs) 25
2.2.5 Key approaches and procedures for POPs chemical and pesticide management including enforcement and monitoring requirements 46
Awareness / understanding of workers and the public 55
2.3 Assessment of the POPs issue in the country 56
2.3.1 Assessment with respect to Annex A part 1 chemicals (POPs pesticides): historical, current and protected future production use, import and export, existing policy and regulatory framework; summary of available monitoring data (environment, food, humans) and health impacts. 57
Past, Present and Projected Future Production and Use of POPs Pesticides 58
Status of POPs pesticides in Turkey 62
Import and Export of POPs pesticides 63
Identified Obsolote Stockpiles and Wastes of POPs Pesticides 63
Present Management (production, use, stockpiles and waste) of POPs Pesticides and Empty Containers 63
Assignment of Responsibility and Liability 63
General Assessment 65
2.3.2 Assessment with respect to PCBs (Annex A, Part II Chemicals) 66
History and place of use of PCBs 67
Present Regulations Pertaining PCBs 68
Closed and Semi-closed Applications of PCBs 68
PCBs Uses 69
PCBs- containing Wastes and related activities 71
General Assessment of Inventory of PCBs 75
2.3.3 Assessment DDT (Annex B Chemicals) 77
History of DDT 78
Institutional and Regulatory Framework 78

Past, Present and Projected Future Production and Use of DDT 78
Identified Stockpiles of DDT and DDT Waste 79
Present Management of DDT and Empty Containers 79
Current Capacity and Experience in the Field of DDT 79
General Assessment of Inventory of DDT 81
Preliminary inventory of production, distribution, use, import, and export 81
2.3.4 Assessment of Releases from Unintentional Production of Annex C Chemicals (PCDD/PCDF, HCB and PCBs) 82
Category 1. Waste Incineration 85
Category 2. Ferrous and non-ferrous metal production 86
Category 3. Power generation and heating/cooking 93
Category 4. Production of Mineral Products 95
Category 7. Production of Chemicals, Consumer Goods 102
Category 8. Miscellaneous 106
Category 9. Disposal/Landfilling 106
Category 10. Identification of Hot Spots 111
2.3.5 Information on the state of knowledge on stockpiles, contaminated sides and wastes, identification, likely numbers, relevant regulations, guidance, remendiation measures and data on releases from sites. 113
Incirlik Military Base 116
Polychlorinated Biphenyls (PCBs) 117
The transformers and capacitors with PCBs in Electricity Generation, and Turkish Electricity Transmission Corporations. 118
HCH and DDT in Kocaeli 118
Illegally dumped hazardous waste in barrels along the Black Sea Coast 119
POPs Contamination in the Black Sea and Mediterranean Sea 120
Possible Contaminated and Priority Sites 123
2.3.6 Summary of Future Production, Use and Releases of POPs- requirements for exemptions 124
2.3.7 Existing Programmes For Monitoring Releases And Environmental And Human Health Impacts, Including Findings 125
Declaration and Reporting of Priority Pollutant Releases: 126
Current Monitoring Standards and Capacity for POPs: 126
Background on Potential Sources of POPs Impacts: 126
Environmental Levels Toxicological And Ecotoxicological Characterization 127
Concentrations of POPs in Abiotic Compartments 127
Air and Precipitation 127
Clean and Wastewaters 128
Seawater 137
Soils and sewage sludges 140
Concentrations of POPs in Biota Freshwater environment: fish and aquatic birds 141
POPs Levels In Humans 143
Organochlorine Pesticides (OCPs) 143
Polychlorinated biphenyls (PCBs) 154
Potential Risk Groups: 165
2.3.8 Current level of information, awareness and education among target groups; existing systems to communicate such information to the various groups; mechanism for information exchange with other Parties to the Convention 166
2.3.9 Relevant activities of non-governmental stakeholders 167
2.3.10 Overview of technical infrastructure for POPs assessment, measurement, analysis, alternatives and prevention measures, management, research and development - linkage to international programs and projects 168
2.3.11 Identification of Impacted Populations or Environments, Estimated Scale and Magnitude of Threats to Public Health and Environmental Quality and Social Implications for Workers and Local Communities 172

Declaration and Reporting of Priority Pollutant Releases: 172
Current Monitoring Standards and Capacity for POPs: 172
Current Occupational Safety Measures of POPs Pesticides and PCBs: 173
Potential Risk Groups 173
General Assessments 173
2.3.12 Details of any relevant system for the assessment and listing of new chemicals (Existing regulatory schemes for assessing new chemicals) 175
2.3.13 Details of any relevant system for the assessment and regulation of chemicals already in the market (Existing regulatory schemes for assessing chemicals already in the market) 177
3.0 Strategy and action plan elements of the national implementation plan 177
3.1 Policy statement 177
3.2 Implementation strategy 180
3.2.1 Implementation Principle 180
3.2.2 National Priority Validation Areas 182
3.2.3 Major Milestones 186
3.2.4 Institutional / Organizational Arrangements and Assignment of Responsibility 187
3.2.5 Implementation Approach 187
3.2.6 Implementation Strategy Review Mechanisms 187
3.3 Activities, strategies and action plan 188
3.3.1 Activity: Institutional and regulatory strengthening measures 188
3.3.2 Activity: Measures to reduce or eliminate releases from intentional production and use 193
3.3.3 Activity: Production, Import and export use, stockpiles and wastes of Annex A POPs Pesticides (Annex A, Part 1 chemicals) 195
3.3.4 Activity: Production, import and export, use, identification, labeling, removal, storage and disposal of PCBs and equipment containing PCBs (Annex A, part II chemicals) 197
3.3.5 Activity: Production, import and export, use, stockpiles and wastes of DDT (Annex B chemicals) if used in the country 200
3.3.6 Activity: Register for specific exemptions and continuing need for exemptions (Article 4) 202
3.3.7 Activity: Measures to reduce releases from the unintentional production of PCDDs/Fs, HCB and PCBs (Article 5). 204
3.3.8 Activity: Identification of stockpiles, articles in use and wastes plan for assessment and management of releases from stockpiles and wastes (Articles 6). 209
3.3.9 Activity: Identification of contaminated sites (Annex A, B and C Chemicals) and remediation in an environmental sound manner 212
3.3.10 Activity: Manage stockpiles and appropriate measures for handling and disposal of articles in use 214
3.3.11 Strategy: Identification of contaminated sites (Annex A, B and C Chemicals) and remediation in an environmentally sound manner. 216
3.3.12 Activity: Facilitating or undertaking information exchange and stakeholder involvement 218
3.3.13 Activity: Public awareness, information and education 220
3.3.14 Activity: Effectiveness evaluation (Article 16) 222
3.3.15 Activity: Reporting 224
3.3.16 Activity: Research, development and monitoring (Article11) 227
3.3.17 Activity: Technical and financial assistance (Article 12 and 13) 229
3.4 Development and capacity building proposals and priorities 231
3.5 Timetable for plan implementation and measures of success 232
3.5.1 Participation of the Stakeholders 233
3.6 Resource requirements 234
Abbreviations 238
Annex 1 240

Executive Summary

This document is Turkey's draft National Implementation Plan (NIP) under the Stockholm Convention on Persistent Organic Pollutants (POPs). It includes a review of current and proposed actions related to Turkey's obligations under the Convention.

This marked the successful completion of a formal United Nations Environmental Programme (UNEP) initiative and associated intergovernmental negotiation to take global action on POPs.

Turkey signed the Stockholm Convention on May 23, 2001 and ratified it on 14 October 2009 and became a party since 12 January 2010. (The Law No. 5871 on Approval of Ratification of "Stockholm Convention on Persistent Organic Pollutant" (Official Gazette: 14 April 2009, No. 27200) was approved by Grand National Assembly of Turkey and the Ministers' Cabinet Decision for Approval of this Law was published Official Gazatte daten on 30 July 2009, No. 27304).

Under Article 7 of the Convention, Turkey is obliged to summit a National Implementation Plan till 12 January 2012.

The before the date mentioned above, Turkey has prepared this draft NIP for review and consideration by Turkish stakeholders and proposed to complete it before the deadline.

The project had five basic goals with the following outcomes:

- Inception phase, involving the establishment of coordinating mechanisms and project organization, managerial structure, an approved work plan the final outcome of this phase was the organization of the Inception Workshop;

- Conducting a POP inventory establishment of necessary national infrastructure and the necessary capacities for its realization the outcome of this phase was the development of the initial National POP inventory;

- Determining priorities and subjects of implementation the outcome was the organization of the National Priority Validation Workshop;

- Formulation of the National Implementation Plan -NIP and specific plans of action for POPs- including their expert evaluation;

- Approval of the National Implementation Plan at the level of involved institutions and groups –organizations of Endorsement Workshop

In the structure of the NIP, due to the complexity of the international agreement of the Stockholm Convention, the activities are group according the thirty articles and seven annexes of the Convention by the UNEP and 127 action plans or strategies within seventeen activities are identified with logical matrix or activities, work plan, budget, coordination and monitoring.

For a proper plan need solid baseline with proper assessments of the Country's current status regarding to POPs that are thirteen assessments of inventories are identified also.

A number of expert, representative of the institutions, ministries, universities, Scientific and Technical Research Council of Turkey – Marmara Research Center and non-governmental organization took part in preparing the inventory and preparation of the NIP.

The twelve POPs defined within the Convention have been classified into in three groups in the Convention text for proposes of control measures:

Annex A: Substances Subject to Elimination	• Aldrin, chlordane, dieldrin endrin, heptachlor, hexachlorobenzene, mirex and toxaphene • Polychlorinated biphenyls (PCBs)
Annex B: Substances Subject to Restricted Use	• DDT
Annex C: Unintentionally Produced Substances	• Dioxins and furans (PCDDs/PCDFs) • Hexachlorobenzene (HCB); ve • Polychlorinated biphenyls (PCBs)

During the third phase of the POPs project which was concluded with the National Priority Validation Workshop, the national priorities validation areas identified. There were:

• Reduction of immediate environmental and health risks of the obsolete stocks and contaminated locations:

As of September 2010,

• 314 kg of 2700 tones of HCH in Kocaeli was sent to Germany for elimination, remain amount was storaged in Merkim Inc. because of lack of financial sources,

• 10.930 kg of DDT in Ankara was sent to IZAYDAS for final elimination

• 150 tones POPs illegally damped at the coastal zone of the Black Sea between Sinop and Samsun have been shipped overseas for elimination.

• Environmentally sound management of PCBs and PCB containing equipment are the priorities in Turkey. Regarding the PCBs, the total numbers of distribution transformers are, as of end-2010, about **335.099**, of which **172.365** belong to TEDAS and Private Distribution Companies which are privatized and **162.734** belong to third parties[1]. Of the transformers belonging to TEDAS and Private Distribution Companies, **145.480** have been scanned through the label reading method, while 100 of them whose labels could not be read were scanned through the analysis method using test kits. As a result of these tests, no transformers were found out to be containing PCBs. Accordingly, the total numbers of registered transformers with PCBs were 290, the number of capacitors were 1972, and in addition, according to March 2006 dated NIP the total amount of PCBs have been estimated to be around 140.000 tonnes. However, realization of the priority objectives; preparation of a

[1] Third parties refer to the private and other public establishments.

detailed inventory on PCBs and PCB containing equipment, establishment of the relevant national infrastructure for effective management, safe handling of PCB containing equipment and gradual phasing-out and disposal of PCBs and PCB containing equipment, shall be made possible only with the relevant organizations notifying of their current status to the Ministry of Environment and Forestry within the scope of the 'Regulation for the Control of PCB and PCT Containing Wastes', which came into force upon being published in the Official Gazette No. 267395 dated December 27, 2007. The inventory of private sector transformers and capacitors which may include PCB should be made in cooperation with sector.

- Developing, revising and enacting consistent legislation with the Stockholm Convention, national and international commitments are needed. The objectives are harmonized legislations according to the Stockholm Convention, appropriate legislation with time limits for phasing out of POPs.

- The reduction of dioxin and furan releases through the introduction of BAT and BEP in industrial sectors identified as key sources of UP-POPs in Turkey.

- Strengthening and clarifying ministerial responsibilities on all aspects of POPs are the priorities. The objectives are well-defined information exchange between relevant ministries, inter-ministerial committee on POPs regular information exchange between parties under the convention.

- Developing National infrastructure for more efficient management of POPs and waste are the priorities. The objectives are the strengthening the Reference Laboratory, the Ministry of Environment and Forestry, Refik Saydam Hygiene Center Head, the Ministry of Health, and the MRC (Marmara Research Centre) TUBITAK (The Scientific and Technical Research Council of Turkey). This include training accrediting standardization of the methods and equipments.

- Capacity building for management of POPs on the priority and the objectives are the identify impacted population through risk assessment and laboratory testing, reduce dioxin and furans and regular monitoring programs on POPs.

- Public awareness is the priority. The objectives is training program on POPs related issues (BAT/BEP guidelines) strengthening publicly available such as information centre on POPs and POPs related information.

- Adherence to he followed as the environment and human health are in all phases of POPs management the impacts of chemicals use, prospect, and detrimental effects and polluters pay principle should be considered altogether citizen right to know should be accepted and integrated multi-stakeholder process should be considered during the chemical management.

- Financial resources and mechanisms should be identified as the priority for the NIP.

According to Turkey's environmental policy, the success depends on the fact that all sections of the population understand the functioning of the environment and the problems it presents. The implication of this is that environmental education should reach all sectors of the community. To this end, continuous and detailed education programmes are being implemented at all levels of society so that every Turkish citizen becomes aware of the

problem and fully assumes responsibility in safeguarding the environment. In the formal system Environmental Education has been integrated into the curriculum of school in Turkey.

In the non-formal system, sustained efforts are being made to promote among policy makers to provide training for resource managers at appropriate levels, and promote greater public awareness and motivation for environment action. Some of these institutions and organizations are:

- Community based and none governmental organization
- Provincial services
- Media
- Religious or faith based organizations
- Universities and Research Institutions
- Ministries and traditional institutions
- Schools

Tools and techniques for disseminating environment related information are magazine, newsletters, journals, brochures, radio/TV, posters, T-shirts and souvenirs are the some of the specific tools techniques are being used in Turkey.

The Ministry of Environment and Forestry consulted with stakeholders and solicited their advice on the development and content of the plan, electronically and in a workshops held in Ankara.

A summary of resource required for the successful and effective implementation of the identified tasks and activities of the National Implementation Plan (NIP) for Turkey is the total about 23.5 million USD for 5 years.

However, this estimated is not include the cost of the elimination of the absolute pesticides and elimination of the PCBs and PCBs containing equipments including transportation, proper pre-storage facilities, destruction and related expenses.

In short, this estimate is not include in the UNIDO Project (Project No: GF/TUR/03/008). Financial and technical support should also be given to the private after the private sector completed the inventory of equipment containing PCBs.

1 Introduction

1.1 Purpose of Turkey's National Implementation Plan (NIP) under the Stockholm Convention on Persistent Organic Pollutants (POPs).

The United Nations Environment Programme (UNEP) Stockholm Convention on POPs (www.pops.int) is a global agreement that come in to effect on May 17, 2004. The objective of this Convention is to protect human health and the environment from Persistent Organic Pollutants. As a Party to the Convention, Turkey has an obligation under Article 7 to develop and implement a National Implementation Plan (NIP)[2]

[2] Article 7 (Implementation Plans) states:

1. Each Party shall:

The purpose of the NIP is to inform the Conference of the Parties and the public regarding Turkey's initiatives current and projected, to meet the requirements of the Stockholm Convention. These initiatives include legislation, regulations, voluntary programs and standards, policies, programs and other related measures including action by Turkish authorities and public stipulate that the NIP for reducing unintentionally produced POPs, including dioxins and furans, hexachlorobenzene (HCB) and PCBs.

1.2 POPs

1.2.1 Brief description of POPs

Persistent Organic Pollutants (POPs) are organic compounds of natural or anthropogenic origin with a particular combination of physical and chemical properties that once released into the environment, they remain intact for exceptionally long periods of time as they resist photolytic, chemical and biological degradation (Buccini 2001)[3]. They include industrial chemicals such as PCBs, pesticides such as DDT and by products such as dioxins and furans. They characterized by low water solubility and high lipid solubility. POPs bioaccumulate in fatty tissues of living organisms, including humans, and are found at higher concentrations at higher levels in the food chain. This way, humans, wildlife and other organisms are exposed to POPs, in many cases for extended periods of time spanning generations, resulting in both acute and chronic toxic effects. In addition, they are introduced to humans through the food chain and passed on from mother to child and are known to have significant immunological, neurological and reproductive health effects and suspected for cancer.

1.2.2 POPs are global issue

POPs are semi-volatile chemicals which evaporate turn the regions in which they are used and are then transported over long distances in the atmosphere. They are also discharged directly or by atmospheric deposition into waterways and are transported by movement of fresh and marine waters, even through ground waters. This result show the widespread distribution of POPs across the globe, including regions where they have never been used inhabited and remote areas.

POPs occur at low levels in air and water, so human concerns arise from their ability to bio accumulate in organisms rather than from direct exposure. POPs have a tendency to

---

a) Develop and endeavor to implement a plan for the implementation of its obligations under this Convention;
b) Transmit its implementation plan to the Conference of the Parties within two years of the date on which this Convention enters in to force for it; and
c) Review and update, as appropriate, its implementation plan on a periodic basis and in a manner to be specified by a decision of the Conference of the Parties.

2. The Parties shall, well appropriate, cooperate directly or through global, regional and sub-regional organizations, and consult their national stakeholders, including women's groups and groups involved in the health of children, in order to facilitate the development, implementation and updating of their implementation plans.
3. The Parties shall, endeavor to utilize and where necessary, establish the means to integrate National Implementation Plans for Persistent Organic Pollutants in their sustainable development strategies where appropriate.

[3] Buccini J. 2001 Implementing Global Action on POPs unde the Stockholm Convention: Issues an Opportunities, Abstract Eco Information 2001, Environmental Risks and Global Community, Strategies and, Meeting the Challenges, Argonne National Laboratory, May 14-18, 2001.

accumulate in fatty tissue of organisms and be transferred along terrestrial and aquatic food chains.

POPs are a global issue for the environment and human health. As explained earlier, they can cause birth defects, various cancers, immune system, dysfunction and reproductive problems in mammals. In addition, the weight of evidence indicates that high levels of exposure ever the long term may contribute to increasing rates of birth defects, fertility problems, greater susceptibility to disease, diminished intelligence disrupting endocrine systems and some types of cancers in humans. The major concern for human health is the effect of exposure to POPs on developing fetus. POPs have been detected in the breast milk of women throughout the world.

1.3 Stockholm Convention

1.3.1 Overview of the Convention

On May 22-23, 2001, 125 countries including Turkey signed the Stockholm Convention, a global agreement under the United Nations Environment Programme (UNEP) that will reduce or eliminate emissions of POPs. The Convention:

- Sets out obligations for countries covering the production, use, import, export, release and disposal of POPs,

- Requires countries to promote, and in some cases require, the use of the best available techniques (BAT) and best environmental practices (BEP) to reduce and/or eliminate emissions of unintentionally produced POPs from certain combustion and chemical processes and

- Includes provisions aimed at preventing the introduction of new POPs and for adding other POPs to the Convention in the future.

With the ratification by 50 countries, the convention entered into force on May 17, 2004.

Because of the Convention includes obligations related to hazardous wastes and their transboundary movements, it is closely linked with the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal (**www.basel.int**) and the Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (www.pic.int).

1.3.2 Overview of the 12 POPs

By signing and after notification by 50 countries, Parties agree to the management and control of 12 POPs are also called “dirty dozen” and to a formal process to consider adding additional substances to the Convention.

The 12 POPs fall into three broad categories: pesticides, industrial chemicals and unintentionally produced POPs. The following description of the three broad categories is based upon UNEP’s Ridding the World of POPs: A Guide to the Stockholm Convention on Persistent Organic Pollutants (2002) and the provide a summary for each (POP) chemical.

POPs can be manufactured for use in various sectors of industry and agriculture or by products of industrial processes and combustion.

Pesticides:

Aldrin - A pesticide applied to soils to kill termites, grasshoppers, corn rootworm, and other insect pests. It was banned in 1979. CAS No. 309-00-2[*].

Chlordane - Used extensively to control termites and as a broad-spectrum insecticide on a range of agricultural crops. It was banned in 1979. CAS No. 57-74-9.

DDT - Perhaps the best known of the POPs, DDT was widely used during World War II to protect soldiers and civilians from malaria, typhus, and other diseases spread by insects. It continues to be applied against mosquitoes in several countries to control malaria. It was restricted in 1978 and banned in 1985. CAS No. 50-29-3

Dieldrin - Used principally to control termites and textile pests, dieldrin has also been used to control insect-borne diseases and insects living in agricultural soils. It was banned in 1971. CAS No. 60-57-1

Endrin - This insecticide is sprayed on the leaves of crops such as cotton and grains. It is also used to control mice, voles and other rodents. It was banned in 1979. CAS No. 72-20-8.

Heptachlor - Primarily employed to kill soil insects and termites, heptachlor has also been used more widely to kill cotton insects, grasshoppers, other crop pests, and malaria-carrying mosquitoes. CAS No. 76-44-8.

Hexachlorobenzene (HCB) - HCB kills fungi that affect food crops. HCB is also an industrial chemical and can be released as an unintentional by-product of combustion processes. CAS No. 118-74-1.

Mirex - This insecticide is applied mainly to combat fire ants and other types of ants and termites. Mirex is also an industrial chemical. It was not authorized in Turkey.

Toxaphene - This insecticide, also called camphechlor, is applied to cotton, cereal grains, fruits, nuts, and vegetables. It has also been used to control ticks and mites in livestock. It was banned in 1989.

Industrial Chemicals:

Polychlorinated Biphenyls (PCBs) - These compounds are employed in industry as heat exchange fluids, in electric transformers and capacitors, and as additives in paint, carbonless copy paper, sealants and plastics. They are also released as an unintentional by product of combustion processes from industries municipal wastes and others like PCBs emissions. CTSP No. 382482.

[*] CAS No – Chemical Abstract Service Number.

Hexachlorobenzene (HCB) - HCB is used in the production of rubber, aluminium, munitions, and dyes and in wood preservation and other manufacturing. CTSP No. 290 362 00 90 00.

Mirex - This chemical is used as a fire retardant in plastics, rubber, and electrical goods. It was not authorized in Turkey.

Unintentionally Produced POPs:

Dioxins - These chemicals are produced unintentionally due to incomplete combustion, as well as during the manufacture of certain pesticides and other chemicals. In addition, certain kinds of metal recycling and pulp and paper bleaching can release dioxins. Dioxins have also been found in automobile exhaust, tobacco smoke and wood and coal smoke.

Furans - These compounds are produced unintentionally from the same processes that release dioxins, and they are also found in commercial mixtures of PCBs.

Hexachlorobenzene (HCB) - HCB is a by-product of the manufacture of industrial chemicals and is released as a result of certain combustion processes. CTSP No. 290362 00 90 00.

Furthermore, POPs may also come out resulting from the major industrial accidents.

1.3.3 International Implementation

United Nations Environmental Programme (UNEP) has been identified as the Secretariat and Global Environmental Facility (GEF) designated as funding sources for the Stockholm Convention.

Since the Stockholm Convention opened for signature in 2001 United Nations Development Organization (UNIDO) has become one of the principal agencies assisting developing and transition economy countries to meet their obligations under the Convention.

Over 50 member states requested assistance and won GEF approval for proposal for about over 40 countries.

2.0 Country baseline

In Turkey, on 15 Jan. 2004, the POPs project started by the Ministerial approval and **Prof.Dr. Altan Acara** was identified as the National Project Coordinator (NPC), thereafter a unit was formed by the NPC in the Ministry of Environment and Forestry, under the Director General Environmental Management **Mr. Musa Demirbaş**, Vice Director **Dr. Aydın Yıldırım**, Department Head **Abdurrahman Uluırmak**, Section Head **Tansu Kaynak** and expert **Dr**.**Menekşe Keski**.

During the first phase of the project, two workshops were organized, one was the Enabling Activities as inception workshop to facilitate understanding the Stockholm Convention on POPs and second was the training on inventory workshop.

The main objective of this project is to prepare inventories by the responsible authorities that will agree upon the information and experience gathered national environmental priorities evolve.

This document produced by the preliminary inventory workshop on POPs which is the first essential requirement of the Convention that will assist the Country can address the POPs issue in the context of the requirements of the Stockholm Convention.

During the first phase of the project, Six Task Teams identified with their coordinators and members that were selected from the responsible institutions and the ministries based on the requirements of the POPs to prepare national inventories.

These six task teams are constituted of:

- **Research Team** to undertake inventories of trade use and distribution of POPs containing products.

- **Contamination Team** to assess contaminated sites, and make absolute stocks and disposal opportunities.

- **Emission Team** to prepare preliminary inventories of unintentionally produced inventories of unintentionally produced POPs (PCDD/PCDF, HCB and PCBs).

- **Institution Team** to assess infrastructure, enforcement, monitoring and R & D capacities. This will include POPs assessment, measurement, analyses, linkage to international programmes and projects.

- **Health Team** to assess the population's exposure to POPs. Existing programmes for monitoring releases and environmental and human health impacts, including findings identifications of impacted populations or environments estimated scale and magnitude of treats of public health and environmental quality and social implications for workers and local communities.

- **National Chemical Profile Preparation Team** to study relevant systems for assessment and listing of new chemicals details of any relevant system for assessment and regulation of chemicals already in the market.

All these Six Task Teams reports consist total 62 members prepared in accordance with the GEF guidelines in step 2 and the recommended format by the UNEP.

Obtained inventories and assessment in these task teams reports will develop a preliminary informal priority list based on their findings which can then be used as an input into developing formal national priorities for the National Implementation and Action Plans for Turkey.

2.1 Country Profile

2.1.1 Geography and population

Turkey is the Europe's second largest country. It is located on the eastern part of the continent bordering on three seas and one inter sea, and characterized by its geographical, climatic, economic and social diversity. Turkey's landscape includes rich plains in the western and central provinces, mountains in the East, a narrow coasts in the North and partly South, lakes in the Northwest and central Turkey and some of the larger lakes and long rivers provide productive lands.

Turkey's population in 2010 is 72.561.312. A large majority of this population (75.5 % - 54.807.219 person) is urban (urban is a place with a population of 20.000 or more) and the rest of the population (24.5 % - 17.754.093 person) is the rural population. The urban population is concentrated in three major urban centres: Istanbul, Ankara and Izmir. Turkey's most populous regions lie in the country's Northwest, West and South part of Turkey. The average age of the population 28.8 and the working population (between 15 to 64 ages) is the 67 % of the total population (2010).

The birth rate is 1.73% (2009), life expectancy 73.2.7 (2006) literacy rate is 88.17.5% (2006), average education level of population is 5.97 years, unemployment rate is 9.9% (2006) and the percentage of women employed in non-agricultural activities is 20.9 (2006)[4].

There are 81 provinces and seven geographical regions in Turkey, essentially for statistical and administration purposes.

They are the Black Sea (1), Marmara (2), Aegean (3), Mediterranean (4) Central (5), Eastern (6) and the South Eastern (7) Regions (See Map 1).

Turkey's 77 million hectares of mostly rugged land lies at the eastern part of the Mediterranean and the South-Western corner of Asia. Its exposure to both maritime and continental weather patterns combines with a highly varied topography to produce several distinct climatic zones.

The map shows the Turkey's provinces and identifies the national and provincial capitals. There are 81 provinces and seven geographical (the Black Sea, Marmara, Aegean, Central, Mediterranean, Eastern and the South Eastern) regions on Turkey.

[4] Turkish Statistics Institute (SSI) Population and Demographical Indicators on the web:http://nkg.tuik.gov.tr/ Population And Development Indicators;

Map1. Regions and provinces

2.1.2 Economic and Political Profile

In 2010, Turkey ranked 16 in the world in gross domestic product per capita. While much of Turkey's wealth is based on the activities of the sectors such as 13.0 percent agriculture, 27.2 manufacture and 59.8% services, there are significant regional differences in Turkey's economy; agriculture plays an important role in the western, southern and central regions, manufacturing and services in the western and southern regions.

Trade is the lifeblood of the Turkish economy with exports accounting for more than 70 percent of the total to EU countries like Federal Germany, Italy, France and U.K making Turkey one of the open economies the Europe and partly in the world.

Turkey's leading exports are automobile vehicles and parts, machinery and equipment, agricultural products and oil, natural gas exporting station of the producing countries.

Between the year 2004 and 2006 Turkey with huge parliamentary majority progressed the political and economic reforms and started the full membership negotiations.EU accession negotiations are likely to be long and difficult and membership will not be until 2015.

Republic of Turkey in a parliamentary republic and has a legal system based on European models and constitution of 1982. The national election took place on November 3rd 2002 and next election after 5 years, due by November 2007. the President elected for a seven year term.

Services are an equally important part of the Turkish economy. It has a growing potential and constitute the single growing sector in Turkish's economy, with 68% of total gross domestic product, 75% of employment and 53% of consumer spending. In the Constitution, the environment has emerged as an area shared among the central and municipal government.

2.1.3 Profiles of Economic Sectors

The Ninth Development Plan is the fundamental policy document covers to period of 2007-2013 that sets forth the transformations Turkey will realize in economic, social and culturel areas in an intagrated approach. According to this plan; GDP is expected to increase at annual avarage rate of 7 percent during the plan period and per capita income is expected to be realized as 10.100 dollars in 2013. In Medium Term Program (2011-2013),it was indicated that per capita income is expected to be realized as 10.043 dollars and 12.157 dollar in 2013. When the sectorel composition in the Turkish economy, which is projected to grow at annual average rate of 7 percent during the Ninth Development Plan period, is examined, the industry and services sectors are expected to come forward. Along with the modernisation of the economy and structural reforms, the share of agricultural sector in total production and value-added is expected to decrease. The share of agriculture sector in production, which was 18 per cent and 11.2 per cent on the average in the 1980-2000 and 2002-2005 periods, respectively, is projected to recede back to 7.8 per cent as of 2013, whereas the annual average growth rate of agriculture sector is expected to be 3.6 per cent during the 2007-2013 period and the share of the industry sector in total production is expected to increase during the Plan period and reach 27.2 per cent at the end of this period.

2.1.4 Environmental Overview

Because of the great diversity in climate, landform, vegetation, resources and economic activities, environmental stresses vary considerably across Turkey. In the forest zones, some of the main concerns ensuring sustainable use of forests non-polluting mining and national parks operations. In agricultural and urban based regions such as the western, southern and central parts concern polluted waters, urban congestion, air pollution and loss of both wildlife habitat and farmland. On the Black Sea, Aegean and the Mediterranean coasts, declining fish stocks and concerns land based pollution are also significant. In the lakes, prime concerns are managing the impacts of resources development and inland fisheries as well as agricultural products, reducing the contamination of food resources by toxic substances emitted from the aquatic environments. The effects of climate change are also increasingly being felt in Turkey's.

A framework exists for multi sectoral collaboration in the control and management of chemicals including POPs in the country.

2.2 Institutional, policy and regulatory framework

2.2.1 Environmental policy, sustainable development policy and general legislative framework

Main objective of this sub-section is to describe the existing overall legal and legislative framework within which Turkey will meet its obligations under the Stockholm Convention through well identified inventories and based on it, implementation of the NIP.

Over the years, significant improvements were recorded in the quality and quantity of the population of Turkey which is the basic dynamics of the economics and social development within a democratic system.

Turkey is determined in its development efforts to carry its further stages inline with a target to surpass the contemporary civilization levels.

Turkey shall become a world state influential at the global level in the 21st century attaining the highest level in culture and civilization, manufacturing products at world standards including the standards of environment sharing the income equitable, securing human rights and responsibilities, realizing supremacy of the law and secularism.

Along with the realization of economic and social development, Turkey is aware of the importance of protecting human health, ecological balance, historical and aesthetic values for sustainable development.

According to Ninth Development Plan Ninth Development Plan (2007-2013) which was approved in the 121st plenary session of Turkish Grand National Assembly on 28.06.2006 in accordance with the provision of the Law No: 3067 dated 30.10.1984, "Natural resources, cultural assets and the environment will be protected considering the future generations, as well" is one of the main princeple. Under the development axes of the Ninth Development Plan, the most important policies and principles for the environment and sustainable development are given below:

- Conditions for protection and utilization of natural resources will be determined by taking the needs of the future generations into consideration. Environmental management systems will be established in order to ensure equitable utilization of natural resources by everyone.

- Fulfillment of international obligations will be realized in the framework of the principle of sustainable development and the principle of common but differentiated responsibility.

- In the stages of investment, production and consumption in all sectors, the instruments, which consider the principle of the polluter and user pay, will be effectively used. In the scope of EU harmonization, in doing legal regulations determining the environmental standards and management, country conditions and efficiency in public administration will be considered.

- It will be ensured that the regulations regarding the environment will be implemented effectively by not allowing them to be interrupted as a result of amnesties.

- In order to benefit from the advantages of economies of scale in the realization and ofenvironmental infrastructure investments, collaboration and coordination will be improved among local administrations and in this scope, establishment of unions of local administrations will be supported.

- Sound and integrated information systems about the environment and the development will be established and the monitoring, auditing, and reporting infrastructure will be improved.

- Activities for researching, protecting and utilizing the biological diversity and genetic resources in Turkey and for transforming them into economic value will be accelerated.

- Agricultural, environmental and technological policies will be assessed in an integrated manner in order to minimize the risks related to bio-security and genetically modified organisms.

- In the framework of the conditions of Turkey, and with the participation of the relevant parties, a National Action Plan that sets forth the policies and measures for reducing greenhouse gas emissions will be prepared. Thus, responsibilities concerning UN Framework Convention on Climate Change will be fulfilled.

- In the sectors sensitive to environment, especially agriculture and tourism, ecological potential will be utilized and protection-utilization balance will be considered.

- More efficient production and less waste will be achieved by increasing the effectiveness in raw material use with the implementation of environment friendly techniques in industry.

- Financial and technical consultancy given to municipalities in the realization of urban infrastructure investments will be improved.

- To identify the urban infrastructure requirement in the entire country towards protecting the environment, an urban infrastructure master plan and financing strategy, which will determine the infrastructure needs such as drinking water, sewer system, wastewater treatment and solid waste disposal facilities of municipalities, will be prepared.

- Systems and technologies most suitable for the conditions of the country will be preferred in the construction, maintenance and operation of water, waste water and solid waste infrastructure facilities related to environment protection.

- Efficient use of water resources of the country will be ensured by reducing losses and illegal uses in existing water supply facilities.

- The works, which were started to make regulations and establish an administrative structure in Turkey related to the allocation, use and improvement of water resources as well as protection against pollution, will be completed.

- Protection of ground water and surface water resources from pollution will be ensured and use of treated wastewater in agriculture and industry will be encouraged.

- The technical and financial assessment of separation at the source, collection,transportation, recycling and disposal stages will be done as a whole in

domestic solid waste management. Landfills, which are solid waste disposal technology that have low investment and operation costsc and is most suitable for the conditions of the country, will be preferred.

- Production of non-domestic wastes will be reduced and collection, transportation,recycling and disposal systems that are suitable for the type of the waste and conditions of the country will be established.

- New financing methods, including the participation of the private sector, will be developed in the realization and operation of environmental investments.

- Capacity of municipalities about the planning, designing, implementation and operation of environmental infrastructure services will be improved.

- Training and informing activities for public will be realized to increase the environmental consciousness.

For improving efficiency of the agricultural structure;

- Achieving food security and safety and sustainable use of natural resources will be taken into account in creating an agricultural structure that is highly organized and competitive.

- The main principles to be adhered in fisheries policies include determination of fisheries policies on the basis of establishing resource utilization balance in fishery production by conducting stock assessment studies in line with the EU acquis, ensuring environmental sustainability in agriculture activities in parallel with the increasing demand and the recently provided supports, and establishing the required administrative structure in compliance with these goals.

- Effective protection of the natural ecosystem of forests against various factors, primarily fires and pests and its management in a multipurpose and efficient way will be aimed by considering the protection- utilization balance, biological diversity, gene sources, forest health, non-wood products and services and ecotourism development.

For Ensuring the Shift to High Value-Added Production Structure in Industry and Services,

- Sustainability of growth will be ensured by considering the consistency of the industrial and environmental policies. In industry, production will be in compliance with human health and environmental rules and importance will be given to social responsibility standards.

For Improving Income Distribution, Social Inclusion and Fight Against Poverty;

- Poverty and inequality in income distribution will be reduced permanently through sustainable growth and policies regarding employment, education, health and working life.

Environmental management and control for the environmental / sustainable development policies are necessary to be carried out effectively based on the principles of the Turkish Constitution and Environmental Law.

Environmental protection is one of the constitutional task of the state as well as the night and responsibility of the citizens of Turkey. According to the fundamental law -the constitution- The Republic of Turkey shall ensure the protection of the natural environment pursuant to the principles of sustainable development and Public authorities shall pursue policies ensuring the ecological security of current and future generations.

The Ministry of the Environment and Forestry is the administration authority supervising and coordinating environmental management and protection activities.

The basic tasks and competences of the Ministry of Environment and Forestry include the drafting of national environmental policies, strategies and applying with legislative initiatives, and the implementation of the adapted policies and enacted laws.

The environmental law no. 2872 and the Government Decree no. 443 in force of law on establishment and duties of the Ministry of Environment with the aim is to ensure economic and social development by protecting human health, ecological balance and cultural, historical and aesthetical values.

The National Environmental Action Plan (NEAP) was prepared in 1998 by Undersecretariat State Planning Organization, responded to the need for a strategy and supplied the concrete actions for integrating environment and development. The aiming of the prepare of the NEAP was;

(a) serving as an input to the Eighth Development Plan;
(b) being used as a building block for Turkey's National Agenda 21; (c) acting as the basis for discussion at the next biannual meeting of the High Council for the Environment of the Ministry of Environment and Frostry
(d) helping to represent Turkey's environmental outlook at upcoming regional and international arena.

In addition, legal and institutional arrangements ensuring sustainable use of national resources. In this context, relevant arrangements are made in the Law on Forests no. 6831, the Reconstruction Law no. 3194, The Law of coasts no. 3621, Law on protection of Cultural and Natural Entities no. 2863, the Law on Encouraging Tourism no. 2634 and in related environmental regulations.

2.2.2 Roles and responsibilities of Ministries Agencies and other governmental institutions involved in POPs life cycles (from source to disposal, environmental fate and health monitoring)

In general legislative framework, the shared nature of environmental jurisdiction in Turkey makes close cooperation among the municipal governments as well as the related ministries vital to the success of natural environmental policies and objectives. In order to develop national policies and standards to address issues of common concern such as air quality and

toxics management, a number of coordinating committees have been created in a variety of policy fields such as environment, energy, and protected areas.

However, it is necessary to structure and provide for the establishment of the permanent unit with expertise networks within the country that would participate on the research, monitoring and management of POPs and coordinate the related institutions.

Environmental issues in Turkey are managed at different levels of government depending on Jurisdiction and scope. Interdepartmental bodies, the council of ministers and inter jurisdictional working committees serve to coordinate the activities of government.

Control of hazardous waste and hazardous recyclable material within Turkey is subject to laws and regulations set in place by the central and municipal governments. The central government regulates national and municipal activities. The central governments are responsible for the licensing of hazardous waste and hazardous recyclable material generators, carriers and treatment facilities as well as for regulating intra municipal movements. Under the Turkish Constitution the Central government has the responsibility for all transboundary pollution issues, including those related to water and air.

The major burden related to the execution of environmentally targeted tasks and their coordination lies within the responsibility of the Ministry of the Environment and Forestry who is overall supervision on the preparation process for the implementation of the provisions of the Stockholm Convention in Turkey including:

- Coordination of policies and strategies regarding POPs,
- Developing principles for waste management,
- Providing pollution reduction of different environmental components,
- Prevention of major industrial accidents in which POPs may release and making the studies in order to limit the effects of the release of POPs from these major industrial accidents,
- Establishing environmental quality standards,
- Coordination of activities promoting the use of Best Available Techniques (BAT) and Best Environmental Practices (BEP),
- Supervision of the execution of capital investment projects and projects funded by foreign resources.

The roles and responsibilities of the ministries in Turkey

- Ministry of Environment and Forestry - MoEF concerns with direct and indirect effects, releasing chemicals into the environments as emissions and wastes to air, water and lands.

- Ministry of Agriculture and Rural Affairs - MARA concerned with the use of agricultural chemicals for the food supplies.

- Ministry of Health - MoH concerned with short and long-term health impacts of chemicals on the public health.

- Ministry of Labour and Social Security - MLLS concerned with occupational health and safety issues related to the handling of chemicals at the workplace.

- Ministry of Industry and Trade - MoIT concerned in the production of chemicals and chemical products and cleaner production technologies.

- Ministry of Transportation– MoT concerned with safe transportation and storage of chemicals during the distribution phase.

- Undersecretariat Foreign Trade - UFT is responsible for the preparation and implementation of the secondary legal arrangements regarding the import and export of chemicals and giving the necessary trade permissions by taking the opinions of the relevant public authorities and institutions.

- Ministry of Justice - MoJ (Legal Affairs) concerned in development and enforcement of law and regulations and issues concerning public access to information and the protection of confidential business information.

- Undersecretariat of Customs - UC responsible for the prevention of improper entrance/exit of chemicals to/from the country in the context of regulations in cooperation with the relevant public authorities and institutions.

- Government Printing and Publication Office – GP-PO concerned in the publication and distribution of laws, regulations and other governmental documents.

- Undersecretariat State Planning Organization - SPO is responsible for the coordination of identification of public investment policies and sustainability for chemical management andenvironment sector. .

- Ministry of Foreign Affairs - MFA coordinates all the international aspects of chemical management relevant to international agreements and Conventions.

2.2.3 Relevant International commitments and obligations

Turkey has signed the Rotterdam Convention, and Montreal Protocol and ratified, Basel Convention participated in international meetings and debates on the environment[5]. A

[5.1] The Rotterdam Convention (1998) (www.pic.int) Convention Regarding Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade It has been signed by Turkey the same year. Turkey is not a party to the Convention yet.

Basel Convention (1989) (www.basel.int) Convention on the Control of Transboundary Movements of Hazardous Wastes and their Disposal; Signed by Turkey in 1989 and ratified on 15.5.2004. It has been published within the scope of Regulation for the Control of Hazardous Wastes dated 27.08.1995 (www.atikyonetimi.cevreorman.gov.tr).

Montreal Protocol (1998) (www.montreal.int) The Executive Council of the United Nations Environmental Program (UNEP), with its decision 19/13 regarding Persistent Organic Pollutants (POPs) in February 1997, has requested an expert group to be set up by the intergovernmental negotiating committee (INC) for the international legally binding application for the 12 Persistent Organic Pollutants.

[5.2]The expert group established for this purpose by the Intergovernmental Negotiating Committee (INC) at Montreal-Canada in June 1998 had its first meeting to determine the relevant international applications regarding the Persistent Organic Pollutants, as its legal responsibility. The follow-up sessions were held at

conscious effort to make the environment a policy issue however begun in earnest after the Stockholm Conference on Human Environment of 1972. It led to the strengthening of the Ministry of Environment of Forestry in Turkey. The Ministry is responsible from management, protection and enhancement the country's environment, in particular, as well as seeking common solutions to global environmental problems.

The major environmental issues and trends are the indication of national environmental priorities are land and water managements, marine and coastal systems, industrial pollution, hazardous chemical management and human settlements. All these priorities were identified by the Ministry of Environment of Forestry. The ultimate aim of Turkey's environmental policy is to improve the surroundings, living conditions and the quality of life of all citizens both present and future.

The objective of this sub-section is to describe how the Government can organize itself to undertake the process of committing itself in international environmental Convention, protocols of other similar agreements and subsequently how it participates in them and fulfils its obligations under them.

As noted earlier, Turkey's distribution of responsibility for environmental issues is complex. While the central government conducts international treaty negotiations on behalf of Turkey, the implementation of international agreements, depending on the subject matter, can be shared responsibility among jurisdictions. The creation of consultative process among the both central and municipal governments and the ministries give results during the negotiations and implementation phases that are both necessary and beneficial for effective environmental management.

Turkey has demonstrated a commitment to implementing programs that address global issues since its participation in the Earth summit, held in Rio de Janeiro in 1992. The 2002 Earth Summit sometimes known as Rio + 10, took place in Johannesburg, South Africa and brought together people from around the world to focus global attention on actions to active sustainable development.

A framework exists for multi sectoral collaboration in the control and management and chemicals including POPs in the country.

2.2.4 Description of existing legislation and regulations addressing POPs (manufactured chemicals and unintentionally produced POPs)

One of the key areas of existing legislation and regulation that has a direct impact on the country's regulatory capacity to respond to the POPs issue is the current legislative framework and associated regulatory controls it has in place for hazardous waste management.

Nairobi-Kenya in January 1999, Geneve-Switzerland in September 1999, Bonn-Germany in March 2000, Johannesburg-South Africa in December 2000. After these series of meetings, it has been opened for ratification by the member states after the meeting held on 21-22 May 2001 at Stockholm-Sweden, on 23 May 2001 at Stockholm-Sweden and simultaneously at The United Nations Headquarters at New York-USA. The agreement has been adopted by the EU and its ratification by the member state legislatures has ben envisaged.

Turkey's international commitments in regard to the Stockholm Convention and the existing Country's legislation and regulation is compared in Table 1. This is also particular importance to the National Implementation Plan.

In the Stockholm Convention, there are articles which are not applicable for certain countries, for example DDT reporting as per Annex B is not applicable for countries, which banned the production, import, export and use of DDT. Table 1.1 shows this difference.

Table 1. The comparison of the Stockholm Convention and existing corresponding legislation in Turkey

Article	No			Brief description	Corresponding legislation
3	1	a	i	Prohibition of production of Annex A POPs	- Directive for Pesticide and Equipment Used for Plant Protection Official Gazette: 4th Feb., 1959, no: 10126 -Regulation for the Control of the Pesticides Official Gazette: 22nd June,1995 no:22321 -Regulation for the Registration of Pesticides and Similar Substances Official Gazette: 17th Feb.,1999 no:23614 - By-law on Restriction of Manufacturing, Placing on the Market and Use of Certain Hazardous Substances and Preparations (Official Gazette 26th December 2008, no: 27092) -Communiqué to Prohibit the Use and Marketing of Certain Active Substances used in the Production of Pesticides Official Gazette: 16th Dec.,2003 no:25318
			ii	Prohibition of import and export of Annex A POPs	-Regulation for the Control of the Pesticides Official Gazette: 22nd June,1995 no:22321 -Communiqué of Standardization for Foreign Trade No. (2004/6) O.G. 31st Dec., 2003 No: 25333
		b		Restriction of the production and use of Annex B POPs	-Regulation for the Registration of Pesticides and Similar Substances Official Gazette: 17th Feb.,1999 no:23614 -Communiqué to Prohibit the Use and Marketing of Certain Active Substances used in the Production of Pesticides Official Gazette: 16th Dec.,2003 no:25318 - Prohibit the Use and Market Plant Protection Products Containing Certain Active Substances, Official Announcement: 23 Dec.,2005 No: 2003/43
	2	a	i	Import of Annex A and B POPs is only for disposal	
			ii	Import of Annex A and B POPs is for use and is permitted	
		b		If exemption is granted for Annex A or B POPs, they are	
			i	exported for environmentally sound disposal	
			ii	to a party permitted to use them	
			iii	to a non party, (certification)	

Article	No			Brief description	Corresponding legislation
		c		If exemption is no longer valid for Annex A POPs, it is exported only for disposal	
	3			If registers for new pesticides and industrial chemicals exist prevent production and use of new chemicals, if criteria of §1 of Annex D is met	-Regulation for the Registration of Pesticides and Similar Substances Official Gazette: 17th Feb.,1999 no:23614 - - Regulation for the Labelling of Pesticides Official Gazette: 1st Sep.,1983 no:18152
	4			If registers for pesticides and industrial chemicals exist include criteria of §1 of Annex D when conducting assessment is done for chemicals currently in use	-Regulation for the Control of the Pesticides Official Gazette: 22nd June,1995 no:22321 -
	5			If exemption is granted ensure that during production or use exposures and releases are minimized (standards and guidelines)	
4				If exemption is filed	
				Procedures for updating it	
				Procedures for withdraw	
5		a		Development of an action plan within two years to address Annex C POPs	
			i	inventories of Annex C POPs	
			ii	evaluation of the efficacy of the laws, policies	
			iii	strategies to meet the obligation (i and ii)	
			iv	guidelines on education and training on the strategies	
			v	process to review the strategies every 5 years	
			vi	schedules for the implementation of this action plan	
		b		promotion of release reduction or source elimination	
		c		promotion of modified materials, products, processes	
		d		require the use of BAT/BEP for new sources within 4 years (Part II Annex C)	
		e	i	promote the use of BAT/BEP for existing sources (Part II and Part III of Annex C)	
			ii	promote the use of BAT/BEP for new sources (Part III of Annex C)	
		g		Release limit values and performance standards may be used	
6	1	a	i	Development of strategies for identifying stockpiles of Annex A and B	
			ii	Development of strategies for identifying products and articles and wastes containing of Annex A, B or C	
		b		Identification of stockpiles of Annex A and B	
		c		Management of stockpiles in environmentally sound manner (Annex A, B)	

Article	No			Brief description	Corresponding legislation
		d	i	Wastes products, articles should be handled, collected transported in environmentally sound manner	-Regulation for the Control of Hazardous Wastes Official Gazette: 14th March, 2005, no:25755 - Decision on the Responsibility Insurance for Hazardous Substances Official Gazette: 25th April, 1991, no: 21002
			ii	wastes products, articles should be disposed of irreversibly	-Regulation for the Control of Hazardous Wastes Official Gazette: 27th Aug., 1995, no:22387 - Legislation on the controlling dangerous waste, Official Gazette: 14 March 2005, no: 25755 - Legislation on dangerous chemicals, Official Gazette: 11 July 1993, no: 21634 - Legislation on the controlling waste oils, Official Gazette: 21 Jan 2004, no: 25353 -Regulation for the Control of Dangerous Substances Causing Pollution to waters and environment, Official Gazette: 26 Nov., 2005, no: 26005
			iii	recycling should not be permitted	
			iv	wastes, products, articles should not be transported across borders without relevant rules	-Regulation for the Control of Hazardous Wastes Official Gazette: 14th March, 2005, no:25755
		e	1	Development of strategies for identification of contaminated sites (Annex A, B and C)	- Regulation for the Control of soil contamination, Official Gazette: 31st May, 2005, no:25831 - Regulation on Control of Polychlorinated Biphenyls and Polychlorinated Terphenyls Official Gazette: 27th Dec, 2007, no:26739
			2	Remediation should be undertaken in an environmentally sound manner	Regulation on Control of Polychlorinated Biphenyls and Polychlorinated Terphenyls Official Gazette: 27th Dec, 2007, no:26739
7	1	a		NIP development	
		b		NIP submission in 2 years	
		c		Periodic review of the NIP (frequency not yet decided)	
	2			NGOs involvement in the NIP preparation and updating	
	3			integration of the NIP into the sustainable development strategy (if applicable)	
8	1			Submission of proposals for listing chemicals in Annex A, B and/or C (if applicable)	

Article	No		Brief description	Corresponding legislation
9	1	a	Facilitation of information exchange on reduction or elimination of POPs use, production and release	
		b	Facilitation of information exchange on POPs alternatives	
	2		Mechanism for information exchange through the Secretariat	
	3		Designation of POPs focal point	
	5		Health related information should not be confidential	
10	1	a	Awareness raising among decision makers	
		b	Provision of all POPs related info to public	
		c	Development and implementation of educational programmes for women, children, least educated	
		d	Public participation into the POPs issues	
		e	Training of workers, scientists, educators, technical and managerial personnel	
		f	Development and exchange of educational materials	
		g	Development and implementation of education and training programmes	
	2		Ensure public access to information on awareness raising activities, information is kept up-to-date	
	3		Encourage professionals to promote awareness raising	1. Directive for the Specification of Precautionary Measures in Institutions/Works that Use Explosive, Flagrant, Hazardous and Harmful Substances O.G.: 24th Dec., 1973, no: 14752 2. Regulation for the Precautionary Health and Security Measures in the Work with Chemical Substances Official Gazette: 26th Dec., 2003 no:25328 3. Regulation for the Precautionary Health and Security Measures in the Work with Carcinogenic and Mutagenic Substances Official Gazette: 26th Dec., 2003 no:25328
	4		Establishment of information centres	
	5		Use of PRTR to disseminate information	
11	1		Encourage R&D and monitoring on	
		a	Sources and releases into the environment	
		b	Presence, levels and trends in humans and environment	
		c	Environmental transport and fate	
		d	Effects on human health and environment	- Human Consumption drinking water (98/83 EC) Official Gazette 17 Feb 2005 no: 25730. - Natural Mineral Waters Official Gazette, 1 Dec., 2004 no:25657. - Legislation on the drinking water obtained or planed from the surface water quality, Official Gazette, 20 Nov., 2005 no: 25999.
		e	Socio-economic and cultural impacts	

Article	No			Brief description	Corresponding legislation
		f		Release reduction and/or elimination	
		g		Harmonized inventories and analytical techniques	
	2	a		Support and develop international programmes	
		b		Strengthen national scientific and technical capacities	
		d		Undertake R&D for alleviating effects on reproductive health	
		e		Make the results of R&D accessible and up-to-date	
		f		Encourage storage and maintenance of R&D info	
15	1			Effectiveness reporting	
	2	a		Statistical data on production, import, export,	
		b		List of states from which it has exported and to which it has exported (Annex A, B)	
	3			Periodicity not yet decided	
Annex A Part II		a		Identify, label and remove from use PCB-containing equipment by 2025	Regulation on Control of Polychlorinated Biphenyls and Polychlorinated Terphenyls Official Gazette: 27th Dec, 2007, no:26739
			i	10% PCBs >5 litres	
			ii	0,05% PCBs >5 litres	
			iii	0,005% PCBs > 0,05 litres	
		b		Reduce the risk of exposure by	Regulation on Control of Polychlorinated Biphenyls and Polychlorinated Terphenyls Official Gazette: 27th Dec, 2007, no:26739
			i	use of intact equipment only	
			ii	not use equipment where food is processed or produced	
			iii	protect electrical failure and undertake regular inspection	
		d		Not allow the recovery of PCBs >0,05%	
		e		Dispose of PCBs by 2028	
		f		Identification of PCB-containing open systems	
		g		Progress report on PCBs elimination in every 5 years	
Annex B Part I			iii	Notification of the Secretariat on closed-system site-limited intermediate quantities (if applicable)	
Annex B Part II	1			Elimination of DDT production and use unless notification is filed	
	2			Restrict production and use for disease vector control	
	3			Notification of the Secretariat and WHO on the use of DDT	
	4			Report on the amounts used and conditions of DDT use to the Secretariat and WHO every 3 years	
	5	a		If DDT is used, Action plan should be developed	
			i	Restrict DDT use to disease vector control	
			ii	Implementation of alternatives	
			iii	Strengthen health care to reduce incidences of the disease	
		b		Promote R&D on safe alternatives to DDT	

Table 1.1 The articles of the Stockholm Convention show applicability

Article	No			Condition	Brief description	Addressed in the NIP	
						Applicable Yes/No	Yes/No
3	1	a	i	Obligation	Prohibition of production of Annex A POPs	Yes	Yes
			ii		Prohibition of import and export of Annex A POPs	Yes	Yes
		b			Restriction of the production and use of Annex B POPs	Yes	Yes
	2	a	i	Obligation	Import of Annex A and B POPs is only for disposal	Yes	Yes
			ii		Import of Annex A and B POPs is for use and is permitted	No	Yes
		b			If exemption is granted for Annex A or B POPs, they are	Yes	Yes
			i		exported for environmentally sound disposal	Yes	No
			ii		to a party permitted to use them	Yes	No
			iii		to a non party, (certification)	Yes	No
		c			If exemption is no longer valid for Annex A POPs, it is exported only for disposal	No	No
	3			Obligation	If registers for new pesticides and industrial chemicals exist prevent production and use of new chemicals, if criteria of §1 of Annex D is met	Yes	Yes
	4			Obligation	If registers for pesticides and industrial chemicals exist include criteria of §1 of Annex D when conducting assessment is done for chemicals currently in use	Yes	Yes
	6			Obligation	If exemption is granted ensure that during production or use exposures and releases are minimized (standards and guidelines)	No	NA
4				Obligation	If exemption is filed	No	NA
					Procedures for updating it	No	NA
					Procedures for withdraw	No	NA
5		a		Obligation	Development of an action plan within two years to address Annex C POPs	Yes	Yes
			i		inventories of Annex C POPs	Yes	Yes
			ii		evaluation of the efficacy of the laws, policies	Yes	Partly
			iii		strategies to meet the obligation (i and ii)	Yes	Yes
			iv		guidelines on education and training on the strategies	Yes	Yes
			v		process to review the strategies every 5 years	Yes	No
			vi		schedules for the implementation of this action plan	Yes	Partly
		b		Obligation	promotion of release reduction or source elimination	Yes	Yes
		c		Obligation	promotion of modified materials, products, processes	Yes	Yes
		d		Obligation	require the use of BAT/BEP for new sources within 4 years (Part II Annex C)	Yes	Partly
		e	i	Obligation	promote the use of BAT/BEP for existing sources (Part II and Part III of Annex C)	Yes	Partly
			ii		promote the use of BAT/BEP for new sources (Part III of Annex C)	Yes	No
		g		Suggestion	Release limit values and performance standards may be used	Yes	Yes
6	1	a	i	Obligation	Development of strategies for identifying stockpiles of Annex A and B	Yes	Yes
			ii		Development of strategies for identifying products and articles and wastes containing of Annex A, B or C	Yes	Yes
		b		Obligation	Identification of stockpiles of Annex A and B	Yes	Yes
		c		Obligation	Management of stockpiles in environmentally sound manner (Annex A, B)	Yes	Yes

Article	No			Condition	Brief description	Addressed in the NIP	
						Applicable Yes/No	Yes/No
		d	i	Obligation	Wastes products, articles should be handled, collected transported in environmentally sound manner	Yes	Yes
			ii		wastes products, articles should be disposed of irreversibly	Yes	Yes
			iii		recycling should not be permitted	Yes	Yes
			iv		wastes, products, articles should not be transported across borders without relevant rules	Yes	Yes
		e	1	endeavour	Development of strategies for identification of contaminated sites (Annex A, B and C)	Yes	Yes
			2	suggestion	Remediation should be undertaken in an environmentally sound manner	Yes	Yes
7	1	a		obligation	NIP development	Yes	Yes
		b		obligation	NIP submission in 2 years	Yes	Yes
		c		obligation	Periodic review of the NIP	Yes	Partly
	2			obligation	NGOs involvement in the NIP preparation and updating	Yes	Yes
	3			obligation	integration of the NIP into the sustainable development strategy (if applicable)	Yes	Yes
8	1			suggestion	Submission of proposals for listing chemicals in Annex A, B and/or C (if applicable)	Yes	No
9	1	a		obligation	Facilitating information exchange on reduction or elimination of POPs use, production and release	Yes	Partly
		b			Facilitating information exchange on POPs alternatives	Yes	Yes
	2			obligation	Mechanism for information exchange through the Secretariat	Yes	Yes
	3			obligation	Designation of POPs focal point	Yes	Yes
	5			obligation	Health related information should not be confidential	Yes	No
10	1	a		obligation	Awareness raising among decision makers	Yes	Yes
		b			Provision of all POPs related information to public	Yes	Yes
		c			Development and implementation of educational programmes for women, children, least educated	Yes	Yes
		d			Public participation into the POPs issues	Yes	Yes
		e			Training of workers, scientists, educators, technical and managerial personnel	Yes	Yes
		f			Development and exchange of educational materials	Yes	Yes
		g			Development and implementation of education and training programmes	Yes	Yes
	2			obligation	Ensure public access to information on awareness raising activities, information is kept up-to-date	Yes	Yes
	3			obligation	Encourage professionals to promote awareness raising	Yes	Yes
	4			suggestion	Establishment of information centres	Yes	Yes
	5			suggestion	Use of PRTR to disseminate information	Yes	Yes
11	1			suggestion	Encourage R&D and monitoring on		
		a			Sources and releases into the environment	Yes	Yes
		b			Presence, levels and trends in humans and environment	Yes	Yes
		c			Environmental transport and fate	Yes	Yes
		d			Effects on human health and environment	Yes	Yes
		e			Socio-economic and cultural impacts	Yes	No
		f			Release reduction and/or elimination	Yes	Yes
		g			Harmonized inventories and analytical techniques	Yes	Yes
	2	a			Support and develop international programmes	NA	NA
		b			Strengthen national scientific and technical capacities	Yes	Yes

Article	No			Condition	Brief description	Addressed in the NIP	
						Applicable Yes/No	Yes/No
		d			Undertake R&D for alleviating effects on reproductive health	Yes	Yes
		e			Make the results of R&D accessible and up-to-date	Yes	Yes
		f			Encourage storage and maintenance of R&D info	Yes	Yes
15	1			obligation	Effectiveness reporting	Yes	Yes
	2	a		obligation	Statistical data on production, import, export,	Yes	Yes
		b			List of states from which it has exported and to which it has exported (Annex A, B)	Yes	No
	3			obligation	Periodicity	Yes	No
Annex A Part II		a		obligation	Identify, label and remove from use PCB-containing equipment by 2025	Yes	Yes
			i		10% PCBs >5 litres	Yes	Yes
			ii		0,05% PCBs >5 litres	Yes	Yes
			iii		0,005% PCBs > 0,05 litres	Yes	Yes
		b		guidelines	Reduce the risk of exposure by		
			i		use of intact equipment only	Yes	Partly
			ii		not use equipment where food is processed or produced	Yes	No
			iii		protect electrical failure and undertake regular inspection	Yes	Yes
		d		obligation	Not allow the recovery of PCBs >0,05%	Yes	Yes
		e		obligation	Dispose of PCBs by 2028	Yes	Yes
		f		promotion	Identification of PCB-containing open systems	Yes	Yes
		g		obligation	Progress report on PCBs elimination in every 5 years	Yes	Yes
Annex B Part I			iii	obligation	Notification of the Secretariat on closed-system site-limited intermediate quantities (if applicable)	No	NA
Annex B Part II	1				Elimination of DDT production and use unless notification is filed	No	NA
	2				Restrict production and use for disease vector control		
	3				Notification of the Secretariat and WHO on the use of DDT		
	4				Report on the amounts used and conditions of DDT use to the Secretariat and WHO every 3 years		
	5	a			If DDT is used, Action plan should be developed		
			i		Restrict DDT use to disease vector control		
			ii		Implementation of alternatives		
			iii		Strengthen heath care to reduce incidences of the disease		
		b			Promote R&D on safe alternatives to DDT		

NA- Not Applicable, ?-There was insufficient information in the NIP to decide if yes or no.

Table 2. Overview of the National Legal Instruments which address the management of chemicals

Legal Instrument	Responsible Ministries or Bodies	Chemical Use Categories Covered	Objective(s) of Legislation	Relevant Articles/ Provision	Resources Allocated	Enforcement Ranking *
Environment Law No:2872 Official Gazette: 11th Aug., 1983, no: 18132	Ministry of Environment and Forests (MoEF) Ministry of Health (MoH), Municipalities	All Chemicals and Pollutants	-Protection and improvement of environment, -prevention of air, water and soil pollution, -establishment of control system, -restriction of hazardous substances, -establishment of a fund for prevention of pollution in the environment, -to specify fines for different charges.	13, 16, 24	n.a.	2
Plant Protection and Agricultural Quarantine Law Official Gazette: 24th May, 1957, no: 9615	Ministry of Agriculture and Rural Affairs (MARA)	Pesticides (agricultural)	To announce the general rules of; foreign trade, local transportation, protection from disease and pests for plants, as well as the rules of foreign trade, production, sale and use of the equipment and pesticides.	38-41	n.a.	1
Cosmetics Law Official Gazette: 26th Feb., 1994, no: 21861	MOH	Consumer Chemicals	To regulate the trade, production and sales of cosmetics and authorization procedures of producers	All provisions	n.a.	1
Decree Law on Production, Consumption and Control of Foodstuffs Official Gazette: 28th June, 1995, no: 22327 (changed by Law no:5179 published on 5th June 2004, no:25483)	MARA	Food additives and chemicals	To form a basis for the production and sales conditions of foodstuffs and measures foreseen for the official food control	4, 7	n.a.	2
Directive Dimensioning the Special Characteristics of Things and Substances Related to Foodstuffs and General Health Official Gazette: 18th Oct.,1952 no:8236	MoH	Pesticides (public health, consumer)	To regulate the trade, production and sales of pesticides (public health and consumer) and authorization procedures of producers	Chapter 38	n.a.	1
Regulation For Chemical Substances That Are Subject To Official Control Official Gazette: 16th June, 2004 no:25494	MoH	Industrial chemicals	To control the legal use and trade of chemicals that are used or have a potential to be used to produce narcotics	All provisions and Annex	n.a.	1
Regulation for the Control of Hazardous Wastes, Official Gazette: 27th Aug., 1995, no:22387	MoEF, Municipalities and MoI	Industrial chemicals, Furan, Dioxin, PCBs	To announce the general rules of; restriction of discharge of hazardous substances and control of foreign trade, standardization of	All provisions and Annex	n.a.	3

			waste management, minimization of waste production and rules of waste production, transport and disposal			
Regulation for the Control of Solid Wastes Official Gazette: 14th Mar., 1991, no: 20814	MoEF	Industrial chemicals	To announce the general rules of; restriction of storage, transport of solid wastes, and to form a basis of administrative, technical principals and policy and programs for the control of these wastes which have adverse effects on the environment	8, 32	n.a.	2
Regulation for the Prevention of Nitrate Pollution in Water Resources Originating from Agricultural Activities Official Gazette: 18th Feb., 2004, no: 25377	MARA and MoEF	Nitrate	To analyze, minimize and prevent the nitrate pollution in water resources originating from agricultural activities	All provisions	n.a.	n.a.
By-law on the Classification, Packaging and Labelling of Dangerous Substances and Preparations Official Gazette 26th December 2008, no: 27092	MoEF	Industrial chemicals, POPs	To form a basis in order to propose and implement administrative, technical and legal principals, policy, and programs for the control of hazardous substances and their products which have adverse effects on environment and human health in the short or long term.	All provisions and Annex	n.a.	2
-By-law on Restriction of Manufacturing, Placing on the Market and Use of Certain Hazardous Substances, Preparations and Articles (Official Gazette 26th December 2008, no: 27092)	MoEF	Industrial chemicals, POPs	to regulate the administrative and technical procedures and principles about restrictions on the manufacturing and use of a certain dangerous substance or substance group on its own, use of them in a preparation or in an article and placing of them in the market to ensure the protection of human health and the environment.			
By-law on the Inventory and the Control of Chemicals (Official Gazette 26th December 2008, no: 27092)	MoEF	Industrial chemicals	to regulate the rules and principles related to preparation of an inventory and control of chemicals in order to protect the human health and the environment against their negative effects.			
By-law on Compilation and Distribution of Safety Data Sheet (Official Gazette 26th December 2008, no: 27092)	MoEF	Industrial chemicals	to determine the administrative and technical principles and procedures related with compilation and distribution of safety data sheet for effective control and efficient surveillance to protect the human health and the environment against adverse effects of dangerous substances and preparations placed on the market.			

By-law on The Control of the Major Industrial Accidents (Official Gazette 18th Agust 2010, no:27676)	MoEF	Hazardous chemicals	To prevent of major industrial accidents in the plants storing the hazardous substances and To determine the rules, procedures and measures which should be taken in order to supply the sound and sustainable protection at a high level for minimizing the harmful effects of possible accidents to human and environment	All provisions	n.a.	n.a.
Directive for Pesticide and Equipment Used for Plant Protection, Official Gazette: 4th Feb., 1959, no: 10126	MARA and Municipalities	Pesticides (agricultural)	To announce the provisions of authorization procedures for production, distribution, sale and foreign trade of pesticides, its raw materials and equipment that are used for plant protection	7-48	n.a.	1
Regulation for the Control of Medical Wastes, Official Gazette: 22th July, 2005, no: 25883	MoEF, Municipalities MENR, MoI, MoH, MoD, HE	Industrial chemicals found in medical wastes	To form a basis in order to propose and implement administrative, technical and legal principals and policy and programs for the separate collection, temporary storage, recycling, transport and disposal of medical wastes	14, 34, 46 Annex-2 (F)	n.a.	2
Regulation for the Control of Water Pollution Official Gazette: 4th Sep., 1988, no:19919	MoEF	Industrial and consumer chemicals, pesticides (ag.) and POPs	To protect the water resources and resource potentials of the country controlling the water pollution providing safe use	6, 22, 26, 31, 33, and 51	n.a.	2
Regulation for the Hazardous Substances in the Water Resources Official Gazette: 26th Nov., 2005, no:26005	MoEF	Hazardous substances	To specify the hazardous and harmful substances that are mentioned in the Regulation for the Control of Water Pollution	All provisions and Annex	n.a.	1
Directive for the Toxicological Classification of Pesticides	MARA	Pesticides	To specify a framework for the toxicological classification of pesticides that are ready to be launched to the market	3-14	n.a.	1
Regulation for the Protection of the Air Quality, Official Gazette: 2nd Oct., 1986, no: 19269	MoEF, Municipalities	Industrial chemicals and POPs	To control all kinds of emissions to protect the environment and human from hazardous effects of the gaseous chemicals	All provisions	n.a.	2
Directive for the Specification of Precautionary Measures in Institutions/Works that Use Explosive, Flagrant, Hazardous and Harmful Substances Official Gazette: 24th Dec., 1973, no: 14752	MoH and MoLSS	Industrial Chemicals	To specify the additional precautionary measures in institutions or works which use explosive, flagrant, hazardous and harmful industrial chemicals	All provisions	n.a.	n.a.
Regulation for Cosmetics Official Gazette: 8th April, 1994, no: 21899	MoH	Consumer Chemicals	To regulate the production, import licensing and control mechanisms for cosmetic materials	All provisions and Annex	n.a.	1

Decision on the Responsibility Insurance for Hazardous Substances Official Gazette: 25th April, 1991, no: 21002	Undersecretariat of Treasury	Industrial chemicals, pesticides (ag.)	To put an obligatory insurance valid during the production, transport and sale of specified hazardous chemicals in order to make the losses paid to other parties	All provisions	n.a.	n.a.
Regulation for the Control of Waste Oils Official Gazette: 21st Jan., 2004 no: 25353	MoEF, Municipalities and MoI	Industrial chemicals, and PCBs, PCT	To form a basis in order to propose and implement administrative, technical and legal principals and policy and programs for prohibition of generation of oil wastes, storage, transport and disposal of these wastes, the establishment of temporary storage and recycling facilities	All provisions and Annex	n.a.	n.a
Regulation for the Chemical Fertilizers Used in Agriculture Official Gazette 27th Mar., 2002 no: 24708	MARA	Industrial Chemicals	To form the basis for the determination of the type and composition of fertilizers, as well as for their nomination, labeling, packaging and control	All provisions	n.a.	1
Regulation for The Wholesale, Retail And Storage of Pesticides Official Gazette: 21st Aug., 1996 no: 22734	MARA	Pesticides (ag.)	To announce the conditions of wholesaling, retailing and storage of pesticides	All provisions	n.a.	1
Regulation for the Control of the Pesticides Official Gazette: 22nd June,1995 no:22321	MARA	Pesticides (ag.)	To announce the control procedures of pesticide producing and importing persons, wholesaling, retailing and storage places of pesticides and related registered persons as well as the pesticide products and their labels	All provisions	n.a.	1
Regulation for the Registration of Pesticides and Similar Substances Official Gazette: 17th Feb.,1999 no:23614	MARA	Pesticides (ag.)	To specify the procedures of registration of pesticides	All provisions	n.a.	1
Regulation for the Labeling of Pesticides Official Gazette: 1st Sep.,1983 no:18152	MARA	Pesticides (ag.)	To regulate the procedures of arrangement and approval of the labels for pesticides and the responsibilities of applicants and authorized persons.	All provisions	n.a.	1
Regulation for the Quality Control Analysis of Pesticides done by the Private Laboratories Official Gazette: 23rd Sep.,2002 no:24885	MARA	Pesticides (ag.)	To announce the conditions for private laboratories that plan to make pesticide analysis	All provisions	n.a.	1
Communiqué to Ban the Use and Marketing of Certain Active Substances used in the Production of Pesticides Official Gazette: 16th Dec.,2003 no:25318	MARA	Pesticides (ag.), POPs	To specify the measures to ban certain active substances used in the production of pesticides	All provisions and annex	n.a.	n.a.

Regulation for the National Commission of Codex Alimentarius Official Gazette: 7th Feb. 1994 no: 18152 (changed by O.G. 13th Sep.,2004 no:25582)	MARA	Food additives and chemicals	To establish a coordinating committee and to give the procedure for the preparation of national codex alimentarius	All provisions	n.a.	1
Regulation for the Precautionary Health and Security Measures in the Work with Chemical Substances, Official Gazette: 26th Dec., 2003 no:25328	MOLSS	Industrial Chemicals and POPs	To put the basis of the healthy and secure environment for workers who work with chemical substances including hazardous substances and POPs.	All provisions	n.a.	2
Regulation for the Precautionary Health and Security Measures in the Work with Carcinogenic and Mutagenic Substances Official Gazette: 26th Dec., 2003 no:25328	MOLSS	Industrial Chemicals	To put the basis of the healthy and secure environment for workers who work with chemical substances that carcinogenic and mutagenic	All provisions	n.a.	2
Regulation for the Precautionary Health and Security Measures in the Work with Asbestos Official Gazette: 26th Dec., 2003 no:25328	MOLSS	Industrial Chemicals	To put the basis of the healthy and secure environment for workers who work with asbestos	All provisions	n.a.	2
Regulation for Environmental Audit Official Gazette: 5th Jan., 2002 no:24631	MOEF	All chemicals, POPs	To establish the provisions of the environmental control around the facilities from their establishment stage to processing and to waste disposal stages, considering the protection of environment	All provisions	n.a.	3
Regulation on the Control of Air Pollution Originating from Industrial Activities Official Gazette 7th Oct.,2004 no: 25606	MOEF	Industrial Chemicals, PCBs, Dioxin and Furans	To control the emissions of industrial and energy generation facilities and to prevent the hazards caused by these emissions.	All provisions	n.a.	
Communiqué of Standardization for Foreign Trade No. (2005/3) Official Gazette 31st Dec.,2003 no: 25333	Undersecretariat of Foreign Trade	Solid fuels and their wastes	To control the importation of solid fuels such as coal, and regulate the issue of Control Certificate by the Ministry of Environment and Forestry. Import of some kind of wastes is prohibited.	All provisions	n.a.	1
Communiqué of Standardization for Foreign Trade No. (2004/4) Official Gazette 31st Dec., 2003 no: 25333	Undersecretariat of Foreign Trade	Consumer Chemicals	To control the importation of certain consumer chemicals such as pharmaceutical products, medicines, cosmetics, detergents, etc., that is subject to the control of Ministry of Health.	All provisions	n.a.	1
Communiqué of Standardization for Foreign Trade No. (2004/6) O.G. 31st Dec., 2003 no: 25333	Undersecretariat of Foreign Trade	Industrial Chemicals and PCBs	To control the importation of certain chemical products that receives a Control Certificate issued by the MOEF. Import of certain chemicals is banned.	All provisions	n.a.	1
Communiqué of Standardization for Foreign Trade No. 2010/6 on chemicals under control	Undersecretariat of Foreign Trade	Industrial Chemicals	To control the importation of certain chemical substances that thins the Ozone layer.	All provisions	n.a.	1

in order to protect the environment Official Gazette: 31st Dec. 2009, no: 27449						
Communiqué of Importation of Fertilizer O.G. 31st Dec., 2003 no: 25333	Undersecretariat of Foreign Trade	Industrial Chemicals	To control the importation of certain fertilizers by demanding an official letter from MARA that products comply with the legislation	All provisions	n.a.	1
Communiqué of Importation of Certain Painting Substances O.G. 31st Dec., 2003 no: 25333	Undersecretariat of Foreign Trade	Industrial Chemicals	To control and ban the importation of certain painting substances that are harmful to human health	All provisions	n.a.	1
Communiqué of Standardization for Foreign Trade No. 2010/3 on Wastes under control in order to protect the environment O.G. 31st Dec.2009, no: 27449	Undersecretariat of Foreign Trade	Hazardous wastes	To provide the controlled import of the wastes which are economically valuable to a recyling plant, to prohibit the import of hazardous chemicals			
Communiqué of Standardization for Foreign Trade No. 2010/5 on the export of products subject to inspection by MARA Official Gazette: 31st Dec. 2009, no: 27449	Undersecretariat of Foreign Trade	Veterinary preparations, pharmaceuticals raw materials, animal feed raw materials, pesticides raw materials	To inspect the conformity of import of products in terms of human health and safety, animal and plant existance and health.			
Communiqué of Standardization for Foreign Trade No. 2010/7 on solid fuels under control in order to protect the environment Official Gazette: 31st Dec. 2009, no: 27449	Undersecretariat of Foreign Trade	Solid fuels	To inspect the conformity to the parameters set by MoEF regarding the import of solid fuels			
Regulation for the Control of Soil Contamination Official Gazette 31th May 2005 no: 25831	MoEF	All Chemicals and Pollutants	- Projection and improvement of environment - Prevention of Rand and soil - Establishment of control system - To specify fires for different charges	Article 6	n.a	1

Source: Official Gazettes: http://rega.basbakanlik.gov.tr

Table 3. The standards related with POPs and chemicals that are published by the Turkish Standards Institute

Code of Standard	Name of Standard
TS 3906 / 01.03.1983	Pesticides-Considered Not to Require Common Names
TS 4385 / 15.01.1985	Determination of the Residues of Some Pesticides on Fruits and Vegetables (Gas Chromatographic and Thin Layer Chromatographic Methods)
TS 7134 / 10.05.1989	Equipment for Distributing Granulated Pesticides or Herbicides-Test Method
TS 8312 / 11.04.1990	Water Quality-Determination of Oil and Grease on Water and Sludge-Soxhlet Extraction Method
TS 7887 / 13.02.1990	Water Quality-Determination of Oil and Grease-Gravimetric Method
TS 10952 / 24.04.1993	Pesticides 4-Chloro –2- Methylphenoxyacetic Acid (MCPA)
TS 11100 / 28.09.1993	Pesticides – Terms and Definitions
TS 11101/ 28.09.1993	Pesticides – Classification
TS 11517/10.01.1995	Pesticides- Testing Methods
TS ISO/DIS 11074-1 /01.04.1996	Soil Quality- Vocabulary- Part 1- Terms and Definitions Relating to the Protection and Pollution of the Soil
TS ISO 11269-2/04.04.1996	Soil Quality-Determination of the Effects of Pollutants on Soil Flora-Part 2: Effects of Chemicals on the Emergence and Growth of Higher Plants
TS ISO 6466 / 04.03.1997	Tobacco and tobacco products; determination of dithiocarbamate pesticides residues; molecular absorption spectrometric method
TS 12198 / 03.04.1997	Environmental health-Training rules for pesticide workers
TS EN 61619 / 04.11.1997	Insulating liquids-Contamination by polychlorinated biphenyls (PCBs)-Method of determination by capillary

	column gas chromatography
TS EN 50225 / 04.11.1997	Code of practice for the safe use of fully enclosed oil-filled electrical equipment which may be contaminated with PCBs
TS 12358 / 23.12.1997	Pesticides-Determination of acetone insoluble matters content
TS 12359 / 23.12.1997	Pesticides-determination of mixibility with hydrocarbon
TS 12362 / 30.12.1997	Pesticides-Azinphos Ethyl and formulations including azinphos ethyl
TS 12363 / 30.12.1997	Pesticides-Determination of diazinon content-Titrimetric method after chromatographic separation or gas chromatographic
TS 12364 / 30.12.1997	Pesticides-Determination of azinphos ethyl content-Spectrophotometric
TS 12365 / 30.12.1997	Pesticides-Diazinon and formulations including diazin
TS 12370 / 20.01.1998	Pesticides-Trifluralin and formulations including
TS 12413 / 30.03.1998	Pesticides-Azinphos methyl and formulations including azinphos methyl
TS EN 1528-4 / 17.04.1998	Fatty Food-Determination of Pesticides and Polychlorinated Biphenyl's (PCBs)-Part 4:Determination, Confirmatory Tests, Miscellaneous
TS EN 1528-3 / 15.04.1998	Fatty food-Determination of pesticides and polychlorinated biphenyls (PCBs)-Part 3:Clean-Up methods
TS EN 1528-2 / 15.04.1998	Fatty Food-Determination of Pesticides and Polychlorinated Biphenyls (PCBs)-Part 2-Extraction of Fat, Pesticides and PCBs and Determination of Fat Content
TS EN 1528-1 / 15.04.1998	Fatty Food-Determination of Pesticides and Polychlorinated Biphenyls (PCBs)-Part 1:General
TS EN ISO 14182 / 21.03.2000	Animal feeding stuffs- Determination of residues of organophosphorus pesticides- Gas chromatographic method
TS EN 1948-1 / 17.04.2000	Stationary source emissions-Determination of the mass concentration of PCDDs/PCDFs-Part 1: Sampling

TS EN 1948-2 / 25.04.2000	Stationary source emissions-Determination of the mass concentration of PCDDs/PCDFs-Part 2: Extraction and clean-up
TS EN 1948-3 / 25.04.2000	Stationary source emissions-Determination of the mass concentration of PCDDs/PCDFs-Part 3: Identification and quantification
TS ISO 4389 / 29.03.2001	Tobacco- Determination of organochlorine pesticide residues- Gas chromatographic method
TS EN ISO 15318 / 22.03.2001	Pulp, paper and board- Determination of 7 specification polychlorinated biphenyls (PCBs)
TS IEC 60997 /27.03.2001	Determination of polychlorinated biphenyls (PCBs) in mineral insulating oils by packed column gas chromatography (GC)
TS EN 12393-1/ 19.04.2001	Non-fatty foods – Multi residue methods for the gas chromatographic determination of pesticide residues – Part 1: General considerations
TS EN 12393-2 / 19.04.2001	Non-fatty foods-Multi residue methods for the gas chromatographic determination of pesticide residue-Part 2: Methods for extraction and clean-up
TS EN 12393-3 / 19.04.2001	Non-fatty foods – Multi residue methods for the gas chromatographic determination of pesticide residues – Part 3: Determination and confirmatory tests
TS EN ISO 14181 / 29.04.2002	Animal feeding stuffs- Determination of residues of organochlorine pesticides- Gas chromatographic method (ISO 14181:2000)
TS ISO 3890-1 / 18.03.2002	Milk and milk products- Determination of residues of organochlorine compounds (pesticides)- Part 1: General considerations and extraction methods
TS ISO 3890-2 / 18.03.2002	Milk and milk products- Determination of residues of organachlorine compounds (pesticides)- Part 2: Test Method for crude Extract purification and confirmation
TS ISO 15089 / 01.04.2002	Water quality – Guidelines for selective immunoassays for the determination of plant treatment and pesticide agents

TS 3696 / 26.02.2003	Pesticides and other agrochemicals-Principles for the selection of common names
TS EN 12766-1 /19.03.2003	Petroleum products and used oils- Determination of PCBs and related products- Part 1: Separation and determination of selected PCBs congeners by gas chromatography (GC) using an electron capture detector (ECD)
TS EN 12766-2/ 19.04.2004	Petroleum products and used oils – Determination of PCBs and related products – Part 2: Calculation of polychlorinated biphenyls (PCBs) content
TS EN 61619 / 04.11.1997	Isolation liquids contaminated with Polichloronated Biphenils (PCBs) – Determination by Gas Chromatography with Capillar Colomn
TS EN 12766-3 / 03.07.2007	Petroluem products and used oils- Determination of PCBs and related products- Part 3: Determination of Polychlorinated Terphenil (PCT) and Polychlorinated Benzly Toluen (PCBT) content using gas chromatography (GC) with an electron capture detector (ECD)

Source: TSE, www.tse.gov.tr ; TUBITAK-MRC

Table 4. The overview of Legal Instruments to manage chemicals by use category

Category of Chemical	Import	Production	Storage	Transportation	Distribution / Marketing	Use / Handling	Disposal
Pesticides (agricultural, public health and consumer use)	X	X	X	X	X	X	
Fertilizers	X	X	X	X	X	X	
Industrial Chemicals (used in manufacturing/ processing facilities)	X	X	X	X	X	X	X
Petroleum Products	X	X	X	X	X	X	X
Consumer Chemicals	X	X			X	X	
Chemical Wastes	X	X	X	X	X	X	X

2.2.5 Key approaches and procedures for POPs chemical and pesticide management including enforcement and monitoring requirements

Table 5. The responsibilities of different government ministries and institutions

Ministry Concerned/ Stage of Life Cycle	Importation	Production	Storage	Transport	Distribution/ Marketing	Use/Handling	Disposal
MoEF	X	X	X	X	X	X	X
MoH	X	X	X	X	X	X	
MARA	X	X	X	X	X	X	
Municipalities			X	X	X		X
MoI (City Governors)		X		X			X
UFT	X				X		
MoLSS						X	
MoIT				X			

Table 6. The summary of expertise available outside the government

Field of Expertise	Research Institutes	Universities	Industry	Environment/Consumer Groups	Labor Unions	Professional Org.
Data Collection	X	X	X			X
Testing of Chemicals	X	X				X
Risk Assessment	X	X	X	X		
Risk Reduction			X		X	X
Policy Analysis	X	X		X		X
Training& Education	X	X	X	X	X	X
Research on Alternatives	X	X				
Monitoring	X			X		
Enforcement				X	X	
Information to Workers			X	X	X	X
Information to Public	X	X		X		X
Others						

Table 7. The Inter-ministerial commissions and coordinating mechanisms

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
Commission of Packaging	Follow up and examination of the implementation of the covering, packaging and recycling waste materials	MOEF	Authorized institutions, previous year received the highest recycling two institutions with two municipalities, and the institutions received licences from the MoEF	
National Commission of Codex Alimentarius	- To coordinate the preparation of national codex alimentarius	MARA	MoH, Selected experts from universities, T.Standards Institute, Expert from NGO.	To work as a coordinating technical body on the preparation of national food codex gathering sub-committees, taking the Regulation for National Commission of Codex Alimentarius as a basis.

Table 8. Data access, use and the quality and quantity of available information

Data Needed for/to:	Pesticides		Industrial Chemicals	Consumer Chemicals	Chemical Wastes
	Agricultural use	Public Health use			
Priority Setting	X		X		X
Classification/ Labelling	X	X	X	X	
Registration	X	X	X	X	
Licensing	X	X	X	X	
Permitting	X	X	X	X	
Risk Reduction Decisions	X		X	X	X
Poisoning Control	X				X
Emissions Inventories					
Inspections & Audits (environment/ health)					
Information to workers	X		X		
Information to the public	X		X		

Note: X means there is "sufficient information" available

Table 9. The location of National data

Type of Data	Location(s)	Data Source	Who has access?	How to gain access	Format
Production Statistics	SIS, SPO	Questionnaire, Annual Programs	Public	Published document, web/ Detailed data upon request	Report/ Bulletin
Import Statistics	SIS, SPO	Officially registered stat., Annual Programs	Public	Published document, web/ Detailed data upon request	Report/ Bulletin
Export Statistics	SIS, SPO	Officially registered stat., Annual Programs	Public	Published document, web/ Detailed data upon request	Report/ Bulletin
Industrial Accident Reports	n.a.				
Transport Accident Reports	n.a.				
Occupational Health Data (agricultural)	MOLSS	Monthly and Annual Statistics	Public	Published document, web	Report/ Bulletin
Occupational Health Data (industrial)	MOLSS	Monthly and Annual Statistics	Public	Published document, web	Report/ Bulletin
Poisoning Statistics	Refik Saydam Hygiene Center	Officially registered stat.	Public	Detailed data upon request	Report
Pollutant Release and Transfer Register	n.a.				
Hazardous Waste Data	n.a.				
Register of Pesticides	MARA	Official registries	Public	Upon request	Report
Register of Toxic Chemicals	n.a.				
Inventory of Existing Chemicals	n.a.				
Register of Imports (pesticides)	MARA, MoH	Official Registries	Public	Application	Report
Register of Producers	MARA, MoH (for pesticides) Association for Chemical Producers	Official Registries Voluntary Application	Public	Application	Report
Prior Informed Consent (PIC) Decisions	MoEF	Internet	Public		
Environmental Health Data	n.a.				
Banned Chemicals	Min. Environment and Forestry, Undersec. of For. Trade (for imports), MARA	Official Gazette	Public	Web/Official Gazette	Published
Reports on Safety and Risk Assessment of Hazardous Substances in Workplaces	n.a.				

Table 10. The availability of international literature

Literature	Location(s)	Who has access?	How to gain access
WHO And Other International Organizations Documents	WHO Liaison Office ILO Ankara Office FAO Representation Internet	Public	Reports, internet
Environmental Health Criteria Monographs (EHCs) (WHO)	MoEF	Public	WHO http://www.inchem.org/pages/ehc.html
Health and Safety Guides (WHO)	MoH	Public	WHO http://www.inchem.org/pages/hsg.html
International Chemical Safety Data Cards (IPCS/EC)	MoLSS	Public	ILO http://www.ilo.org/public/english/protection/safework/cis/products/safetytm/toc.htm UNEP/WHO/ILO http://www.inchem.org/pages/icsc.html
WHO Food Additive Series	MARA	Public	FAO http://apps3.fao.org/jecfa/additive_specs/foodad-q.jsp
Documents from the FAO/WHO Joint Meeting on Pesticide Residues	MARA	Public	FAO http://www.fao.org/ag/agp/agpp/Pesticid/
Decision Guidance Documents for PIC Chemicals (FAO/UNEP)	MoEF	Public	FAO/UNEP www.pic.int
FAO/WHO Pesticides Safety Data Sheets	MARA	Public	FAO http://www.fao.org/ag/agp/agpp/Pesticid/
Environmental Health Perspective and supplements	MoEF	Public	EHP http://ehp.niehs.nih.gov/
Environmental Monitoring and Assessment	MoEF ULAKBİM - TUBİTAK	Public	Kluwer Online http://www.kluweronline.com/issn/0167-6369/contents
Good Manufacturing Practice Principles	MoH	Public	WHO http://www.who.int/medicines/organization/qsm/activities/qualityassurance/gmp/gmpcover.html
Material Safety Data Sheets (industry)	MoLSS	Public	Web http://www.msds.com/ http://www.msdsonline.com/ http://www.ilpi.com/msds/osha/index.html
International Chemical Safety Cards (ICSC)	MoLSS	Public	ILO **http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/index.htm**
Journals, Bulletins and Newsletters Journals: Environment, Development and Sustainability Environmental & Resource Economics Environmental and Ecological Statistics Environmental Biology of Fishes Environmental Fluid Mechanics Environmental Geochemistry and Health Environmental Modelling & Assessment Environmental Monitoring and Assessment The Environmentalist	-ULAKBİM – TUBİTAK, -Middle East Technical Univ.	Public	Upon Request
Environment International environmental Action (Washington, D.C.) environmental and Molecular Mutagenesis Environmental Geology (Berlin) Environmental Geosciences Environmental Health Environmental Health And Preventive Medicine	-Middle East Technical Univ.	Public	Upon Request

Environmental Health Perspectives Environmental Health Perspectives. Supplements Environmental Impact Assessment Review Environmental Management And Health Environmental Management Handbook Environmental Microbiology Environmental Nutrition Environmental Policy And Law Environmental Politics Environmental Pollution Environmental Pollution. Series A. Ecological and Biological			
Environmental Pollution. Series B. Chemical and Physical Environmental Progress Environmental Quality Management Environmental Sciences Environmental Toxicology Environmental Toxicology And Pharmacology Environmental Toxicology And Water Quality Chem. Inform Chembiochem : a European Journal of Chemical Biology Chemical & Pharmaceutical Bulletin Chemical and Petroleum Engineering Chemical Health & Safety Chemical Journal on Internet Chemical Research in Toxicology Toxic Substance Mechanisms Toxicological Pathology	-Middle East Technical Univ.	Public	Upon Request
Toxicological and Environmental Chemistry Toxicological Sciences Toxicology (Amsterdam) Toxicology and Applied Pharmacology Toxicology and Industrial Health Toxicology In Vitro Toxicology Letters Toxicology Mechanisms and Methods Toxicology Methods			

Table 11. The availability of international databases

Database	Location(s)	Who has access?	How to gain access
IRPTC	MoH-Refik Saydam Hygiene Center	Staff	Reports (not available since 1993), web site http://dbserver.irptc.unep.ch:8887/irptc/owa/lg.search_for?iscas=&iarea=&isubject=&ispec=
ILO	Related organizations	Public	http://www.ilo.org/public/english/protection/safework/cis/products/icsc/dtasht/index.htm
IPCS INTOX	MoH-Refik Saydam Hygiene Center	Staff	Reports, web site http://www.intox.org/databank/index.htm
IPCS INCHEM	MoH-Refik Saydam Hygiene Center	Staff	Reports, web site http://www.inchem.org/pages/jmpr.html
Global Information Network on Chemicals (GINC)	Related organizations	Public	http://www.nihs.go.jp/GINC/webguide/csinfo.html
STN Database	n.a.		
Chemical Abstract Services Database -CAB Abstracts -CHEMnetBASE	ULAKBİM - TUBİTAK Middle East Tech. Uni.	Public or Researchers	Upon Request
-IPA(International Pharmaceutical Abstracts) -Medline (OCLC) -PubMed	ULAKBİM - TUBİTAK	Public	Upon Request
ISI Web of Knowledge	Middle East Tech. Uni.	Public or Researchers	Upon Request
JECFA	MoH- Refik Saydam Hygiene Center	Staff	Bulletin
IARC	MoH- Refik Saydam Hygiene Center	Staff	Bulletin

Table 12. The technical and laboratory infrastructure

Name/Description of Laboratory	Location	Equipment/Analytical Capabilities Available	Accreditation (if yes, by whom?)	Certified GLP (yes/no)	Purpose
MARA, Province Control Laboratory	Ankara	GC-ECD, GC-NPD, GC-FPD, GC-MS, HPLC, HPLC-Pickering, HPLC-Cobracell, LCMS/MS, GCMS/MS, HPLC-Gel Permiation	Yes		Pesticides PCBs, Food
MARA, Province Control Laboratory	Izmir	GC, GC-FID, GC-ECD, GC-MS, HPLC, GC-NPD, HPLC-Pickering	Yes		Pesticides, Food
MARA Province Food Inspection Laboratories	Bursa, Istanbul, Samsun, Mersin, Antalya	GC-MS, GC-NPD, GC-ECD, HPLC	No		Pesticides, Food
MoH Refik Saydam Hygiene Center	Ankara	GC, GC/MS, HPLC, AAS	No		Pesticides PCBs
MoEF, Environment Reference Laboratory	Ankara	HPLC, GC, GPC, GC/MS	No		Pesticides
TUBITAK-Marmara Research Center	Gebze	GC, GC-FID, GC-ECD, GC-MS, HPLC	Yes		PCDD/F Pesticides, Food
TUBITAK-ATAL	Ankara	GC-FID, GC-MS, HPLC, LC-MS	Yes		Pesticides
TUBITAK-BUTAL	Bursa	GC-FID, GC-MS, HPLC	Yes		Pesticides
Middle East Technical University (Environmental Eng. And Chemistry Dept.)	Ankara	HPLC, GPC, ICP/MS, LC/MS, GC/MS, GC	No		Pesticides PCBs
Ege University-EBILTEM	Izmir	GC-FID, GC-MS, HPLC	No		Pesticides
Hacettepe Uni. Chemistry Dept.	Ankara	GC, GC/MS, AAS, HPLC	No		Pesticides
Yıldız Technical Uni. Chemistry Dept.	Istanbul	GC/MS, AAS			Pesticides PCBs

Source: MoEF, TUBITAK-MRC

Table 13. The computer capabilities

Computer System / Database	Location	Equipment Available	Current uses
PC and Mac, at least one PC per researcher	TUBITAK Marmara Research Centre Gebze, Kocaeli	Yes	Research and Development
PC, but total number per personnel is not enough	MoEF, Ankara	Yes	Inspection and monitoring
PC, but total number per personnel is not enough	MARA, Ankara	Yes	Quality Control and R&D
PC, but total number per personnel is not enough	MoH, Ankara	Yes	R&D, Monitoring

Source: TUBITAK-MRC

Table 14. The international linkage; the membership in international organizations, programs and bodies

International Organization /Body /Activity	National Focal Point (Ministry/ Agency & Primary Contact Point)	Other Ministries/ Agencies Involved	Related National Activities
International Forum on Chemical Safety (IFCS)	MoEF (DG for Environmental Management)	Related ministries	Submission of official report or opinions
UNEP IRPTC- National Correspondent IE/PAC- Cleaner Production Centre	MoEF (DG for Environmental Management)	Related ministries	Submission of official report or opinions
IPCS	MoEF (DG for Environmental Management)	-	Submission of official report or opinions
WHO	MoH (DG for Basic Health Services) Mr. Cengiz KESİCİ Ms. Dilek DİKMEN	MoEF, MARA	Related Project Design and Implementation, Common organizations, Submission of official report or opinions
FAO	MARA (Dept. of External Relations and EU)	MoH	Related Project Design and Implementation, Common organizations, Submission of official report or opinions
The United Nations Industrial Development Organization (UNIDO)	MoEF (Dept. of External Affairs)	MARA, MoH	Related Project Design and Implementation
ILO	MoLSS	MoH	Related Project Design and Implementation, submission of national report or opinions
World Bank	MoEF	-	Related Project Design and Implementation, submission of official report or opinions
OECD	MoEF	MARA, MoH	Submission of official report or opinions

Table 15. Participation in international agreements/procedures related to chemical management

International Agreement	Primary Responsible Agency	Relevant National Implementation Activities
Agenda 21-Commission for Sustainable Development	Ministry of Interior	The project entitled the "Promotion and Development of *Local Agenda 21*s in Turkey" has been implemented since 1997.
UNEP London Guidelines (voluntary procedure)	MoEF (DG for Environmental Management)	Submission of official opinions
FAO Code of Conduct (voluntary procedure)	MARA (Dept. of External Relations and EU)	Submission of official opinions, coordination between related bodies, preparation of legislation
Montreal Protocol	MoEF (DG for Environmental Management)	Submission of official opinions, coordination between related bodies.
UN Recommendation for the Transport of Dangerous Goods	MoEF (DG for Environmental Management)	Coordination between related bodies, preparation of legislation
ILO Convention 170	n.a.	-
Basel Convention	MoEF (DG for Environmental Management)	and Implementation of the Convention, submission of national report or opinions to the Secretariat.
London Convention	n.a.	-
GATT /WTO agreements(related to Chemicals trade)	Undersecretariat of Foreign Trade	Notificaiton of the technical legislation which affects the placing on the market of chemicals to the Secretariat of WTO in the context of TBT Agreement. Following the legal arrangements regarding chemicals in the context of NAMA, submission of the official opinions and ensuring the coordination between relevant institutions.
Chemicals Weapon Convention Turkey: signed on 14th Jan.,1993 entry into force: 11th June, 1997	Ministry of Defence	Preparation of legislation, submission of official opinions
Regional / Sub regional Agreements: Convention on the Protection of the Black Sea Against Pollution (approved by the Board of Ministers in 28th Jan., 1994) Convention on the Protection of the Mediterranean Sea Against Pollution Originating From Sources or Activities on Land (approved by the Board of Ministers in 22nd July, 2002)	MoEF (DG for Environmental Management)	Activities in scope of Convention on the Protection of the Black Sea are; a project implemented for formation of a National Action Program and a project of Monitoring of Contamination originating from land and rivers. Activities in scope of Convention on the Protection of the Mediterranean Sea are a project done for scientific measurement and monitoring of contamination and another project of monitoring of contamination originating from land.
Bilateral Agreements (specify)	n.a.	

Table 16. The participation in relevant technical assistance project

Name of Project	International / Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Dioxin Emission in Candidate Countries	European Union (DG Environment)	TUBITAK-MRC	-A four-day training provided by experienced experts from Poland -Supervision of PCDD/F emission sampling by the experienced Polish experts -The opportunity to compare their own results with those of the Polish team in order to evaluate the correctness of their own methods. -Dioxin measurements at two secondary aluminium plants -The dioxin measurements in Bulgarian Power Plant -PCDD/F inventories produced for big emission sources for Turkey
Reduction of Pesticide Residues in Environment and Processed Products	NATO	MARA-Izmir Bornova Plant Protection Research Inst.	In the context of traceability, pesticide residue analysis is conducted to agricultural products starting from farm up to end-product.

Awareness / understanding of workers and the public

Confederation of Turkish Labour Syndicates (TURK-IS) gives priority to occupational health and safety and considers the issue with the environment. In the field of determination of the risky jobs, vocational training, training in different issues, on-work vocational studies, activities like, workshops, symposium are organized and brochures, booklets are published. Vocational training targeting young workers and awareness against child workers are included in the training studies.

As an affiliated body of MoLSS, Social Security Training and Research Centre is the only public vocational training organization. The main fields of training in that centre are:

- Risk analysis and precautionary measures in chemical industry (storage, transport, use etc.)
- Occupational security in the places working with flammable and explosive materials
- Occupational security in casting, high temperature ovens and furnaces
- Precautionary occupational health and security measures in places working in dusty environment
- Precautionary occupational health and security measures in mines
- Precautionary occupational health and security measures in the places working with lead and its compounds
- Precautionary occupational health and security measures in the places working with asbestos
- Precautionary occupational health and security measures in the places working with solvents
- The impact of environmental health on workers
- Occupational health and security in construction works.

In the DG Electric Generation, vocational training programs especially for the workers working in the powerhouses with a possible exposition to PCBs have been organized. Booklets to increase awareness and understanding of workers have been published.

In some of the City Chambers affiliated with the Union of Chambers and Commodity Exchanges of Turkey, there are departments of environment working on the environmental issues. These are:

▪ Istanbul Chamber of Industry	http://www.iso.org.tr/
▪ Bursa Centre of Environment	http://www.bcm.org.tr/
▪ Adana Chamber of Industry	www.adaso.org.tr
▪ Ankara Chamber of Industry	http://www.aso.org.tr
▪ Denizli Chamber of Industry	www.dso.org.tr
▪ Aegean Regional Chamber of Industry	www.ebso.org.tr
▪ Eskisehir Chamber of Industry	www.eso.org.tr
▪ Gaziantep Chamber of Industry	www.gso.org.tr
▪ Istanbul Chamber of Commerce	www.tr-ito.com
▪ Kayseri Chamber of Industry	www.kayso.org.tr
▪ Kayseri Chamber of Commerce	www.kayserito.org.tr
▪ Kocaeli Chamber of Industry	www.kosano.org.tr
▪ Konya Chamber of Industry	www.kso.org.tr
▪ Konya Chamber of Commerce	www.kto.org.tr

These chambers also have waste exchanges working in different extents. Environmental test laboratory facilities are planned to be established in a number of these chambers, as well.

There are also a number of regional NGOs, like Environment Foundation of Turkey, Foundation of Black Sea Training Culture and Protection of Environment organizes seminars, publish books and brochures to raise public awareness.

South East Mediterranean Environmental Education Project (SEMEP) is focused on natural and cultural education in the country. Ministry of National Education is the coordinator of the project and counterpart of UNESCO. It is used to raise local public awareness in the voluntary primary and middle schools. Foundation of Environmental Education of Turkey is another NGO giving education in primary and middle schools.

Chamber of Environmental Engineers is another public institution that prepare reports, books and organize seminars to raise public awareness and for vocational training.

Greenpeace Mediterranean organizes campaigns and publishes newsletters and press news to publicize environmental problems in the country.

2.3 Assessment of the POPs issue in the country

This section would establish the scope and characteristics of POPs issues by providing the current technical knowledge base within the country, on which the NIP will be developed.

In Table 17 an institution of the Scientific and Technical Council of Turkey (TUBITAK) Marmara Research Centre (MRC) is shown as an example for the resource available and needed in Turkey.

The quantitative basis of the issue would typically be established by the development of inventories of the POPs covered by the Convention.

This section is the concise overview of the major points as objectives, national priorities and key issues, summarized for each Task Team report based on the terms of references of the each report which are given in the UNEP and the UNIDO POPs Projects.

Table 17. Resources available (A) and needed (B) in government ministries / institutions to Fulfil Responsibilities Related to Chemical Management

A. Ministry/ Institutions	Number of Professional Staff	Type of Expertise Available	Financial Resource Available (per year)
A.TUBITAK-MRC, Environment and Chemistry Institute (ECI)	677 (57 for ECI)	Research and Development	130.000 $ (100 $ per samples of dioxin and furan)
B. TUBITAK-MRC	Min 6 staff (1 Env.Eng. 2 Chem.Eng. 1 Food Eng. 2 Technician)	Research and Development	(Training Requirement) Training on Pesticides Analysis for different matrices- Training on PCBs/Dioxin Analysis for different matrices- Training on quality control and method validation for POPs analysis

The study of six Task Teams and their terms of references would provide assessment of POPs issues in the country and this structure addresses the specific requirements and principles of the Convention. In other words, with this assessment of the sub-section of the POPs issues, terms of references are divided into six Task Teams and given on the thirteen terms of references (Table 18)

Table 18. The Terms of References Number of the UNEP document and the Task Teams

Task Team	**UNEP Terms of References No**
1. Research	2.4 2.3.1 2.3.2 2.3.3
2. Contamination	2.5 2.3.5
3. Emission	2.6 2.3.4 2.3.6 2.3.12
4. Institution	2.8 2.9 2.11 2.3.8 2.3.9 2.3.10
5. Health	2.12 2.3.7 2.3.11
6. National Chemical Profile Preparation	2.1 2.3.12 2.3.13

Sub-section 2.3 altogether would provide the current state of knowledge about POPs in the country.

2.3.1 Assessment with respect to Annex A part 1 chemicals (POPs pesticides): historical, current and protected future production use, import and export, existing policy and regulatory framework; summary of available monitoring data (environment, food, humans) and health impacts.

In Turkey pesticide use started in 1950's. In 1957, "Plant Protection and Agricultural Quarantine Law" was put into force by the parliament. "Directive Concerning the Method and Principles of Registration of Pesticides and Similar Products Used in Plant Protection" was put into effect as a part of this law, which enabled the registration of plant protection products and plant regulators. Trading of such chemicals has been regulated by "Regulation on Sales of Plant Protection Chemicals", which was based on the mentioned law. Provisions of this regulation are constantly being amended according to developments in the use of plant protection products and plant regulators, including their retail and registration. International advancements, European Union standards or applications and scientific advice are monitored to have a dynamic and active approach for the plant protection.

The authorization for the use of any pesticide is aligned with international rules. When the use of a pesticide is banned in the world, it will also be banned in Turkey. Registration Committee of

Ministry of Agriculture and Rural Affairs (MARA) register agricultural pesticides after studying the chemical and physical properties, biological activity, residues, toxicological and eco-toxicological properties with internationally approved analysis methods and techniques. MARA monitors registered pesticides from their production or import to their consumption. Pesticide retailers are constantly controlled by the Provincial and County Directorates of MARA responsible from market control. Unsatisfactory product standards for the samples taken during market control, necessitates punitive actions.

According to 1998 statistics, a total of 3 million tons of pesticides are produced annually in the world. According to 1994 statistics, North America has the biggest share in the pesticide market with 30%. Market shares of other regions are as follows; Western Europe 25%, Asia 16%, Latin America 13%, Japan 12%, Africa 2% and Eastern Europe 2%. It has been known that, especially in the USA and the EU, intensive agriculture, and pesticide usage pollute the nature and have harmful effects on the environment.

Turkish agriculture cannot be considered in the same manner. Data on pesticide use in agriculture supports this statement. Pesticide use per hectare as active ingredient is 0.63kg for Turkey, whereas it is 17.5 kg for Netherlands, 3.5 kg for USA, 4.4 kg for Germany and France, 7.6 kg for Italy and 6 kg for Greece. It is clear that when compared with developed countries, pesticide use levels are very low in Turkey. Thus, agricultural sector in Turkey is not an environment-polluting sector, rather affected by the pollution.

Although pesticides were considered as lifesavers when first introduced, later studies showed the contrary. Especially organic chloride containing pesticides have persistent chemical structure in the environment. These pesticides accumulate in the organisms or atmosphere. They also cause reproductive problems, birth defects, destruction of immune and endocrine systems and may cause cancer.

Fat tissue samples were taken from numerous patients and were analyzed to determine if pesticides cause leukaemia or cancer. It was found that these fat tissues contain higher levels of dieldrin compared with the control group. In a study for the stability of aldrin, it was found that aldrin was still present even 9 years after the application. Aldrin, chlordane, endrin, heptachlor, HCB, toxaphene can reside in soil even after 14 years, with the residue levels 40%, 40%, 41%, 16%, 10% and 45% respectively.

According to the reports of MARA, there is only an approximate of 2,700 tons of HCH present in the stocks.

Past, Present and Projected Future Production and Use of POPs Pesticides

According to the statistics, the total use of pesticides in Turkey was 36,662 tons in 1985, 33,713 tons in 1997, 35,487 tons in 1998, 32,230 tons in 1999, 33,548 tons in 2000, 29,798 tons in 2001, and 30,792 tons in 2002. It can be observed that, over the 17-year period, use of pesticides decreased. These quantities represent registered pesticides (Table 19).

A total of 1231 commercial pesticides had been registered in 1995, though the picture changed in 2004 as 485 active ingredient and 3006 commercial pesticides were registered in Turkey. However, due to various reasons only 252 active ingredients containing registered pesticides are commercially available.

POPs pesticides ban was started in Turkey by 1970’s, and their use, production, import, and export are prohibited by law.

Table 19 Annual amounts of authorized pesticides use in Turkey

Year	Amount of pesticide use (tons)
1985	36,662
1997	33,713
1998	35,487
1999	32,230
2000	33,548
2001	29,798
2002	30,792

Dieldrin was banned in 1971, aldrin, chlordane, heptachlor, endrin were banned in 1979 and toxaphene was banned in 1989. In addition, registrations of plant protection products containing these active ingredients were cancelled. Mirex and its products have never been registered in Turkey. There is no record of production of POPs pesticides in Turkey since their ban. After registration, plant protection products were being prepared by using imported active ingredients. Production of those active substances in Turkey has never been an issue. Records from Undersecretariat of Foreign Trade and Undersecretariat of Customs show the fact that POPs substances have not been imported or exported after they had been banned.

Nationwide residue monitoring of chloride containing pesticides has being performed on agricultural products, soil, and streams. No illegal use of such substances has been detected. As required by the Stockholm Convention, necessary arrangements are initiated for frequent inspection by MARA.

Detailed information on some POPs pesticides are given below (see also 1.3.2):

Aldrin is used for combating insects in the soil. It can easily be metabolized into dieldrin in plants and animals. As a result, it is very difficult to find aldrin residues in foods and animals, if so in very small quantities. It is bound to the soil particles firmly. Due to its high volatility, it disappears in soil. Because of its persistency and hydrophobic property, aldrin and especially its transformed products become bio-concentrated.

Aldrin is toxic to humans. The lethal dos of Aldrin for an adult is estimated as 83 mg/kg body weight. It was observed that liver and gallbladder cancer rate increased in the professionals who were exposed to aldrin. Only evidence for aldrin causing cancer is based on animal tests. Therefore, IARC (International Agency for Research on Cancer) does not classify aldrin as human carcinogen. Table 20 shows some details of the aldrin use in the past. It is banned in Turkey in 1979.

Table 20 Aldrin useage on pests

Name of pest	Active Ingredient	Formulation	Dosage
Anisoplia spp.	Aldrin	WP	750 g / 100 kg seed
Anisoplia spp.	Aldrin	Powder	750 g / 100 kg seed
Zabrus spp.	Aldrin	WP	300 g / 100 kg seed
Zabrus spp.	Aldrin	Powder	300 g / 100 kg seed
Polyphylla fullo	Aldrin	WP	12.5 kg / hectare

* WP wet table Powder

Chlordane is a wide spectrum contact insecticide. It is semi–volatile, so it can be present in the atmosphere. It can be bound to sediments in the water easily and become bio-concentrated in the fat tissues of organisms.

There is no relation between increase in death risk caused by cancer and Chlordane exposure. When the Chlordane exposed persons were checked up, it has been detected that significant changes had been occurred in their immune system. IARC categorizes Chlordane as a possible human carcinogen. Average half-life in soil is 1 year. Chlordane was banned in Turkey in 1979.

Dieldrin was used to combat harmful insects in soil and disease vector insects. Due to its harmful effects on nature and human health, many countries banned dieldrin. Dieldrin is bound to soil particles firmly. It vanishes due to its high volatility in soil. It becomes bio-concentrated because of its persistency and hydrophobic properties. Dieldrin has a half-life of 5 years in warm soil. Dieldrin residues were found in air, soil, fish, bird, mammals, human, and mother's milk. Dieldrin was banned in 1971.

Relative increase of liver and gallbladder cancer were observed at workers contacting aldrin, endrin and dieldrin in factories. IARC did not classify dieldrin as a possible human carcinogen as there was no relevant evidence of both human and animal tests.

Endrin is an insecticide that is used on green parts of plants. It is also used as a rodenticide. It is fast metabolized in animals and do not accumulate in fat tissues. It can reach atmosphere due to its volatile structure. It can also reach surface waters after being washed away from the soil.

Endrin is very toxic for fish. Its half-life in soil can reach up to 12 years depending on the properties of the location.

Heptachlor is a non-systemic, effecting through digestive system and by contact. It has a very high volatility, so it can be found in the atmosphere. It can be bound to sediments in the water easily and become bio-concentrated in the fat tissues of organisms. Heptachlor is metabolized to heptachlor epoxide in animals and this substance can be stored in animal fat tissues.

It was determined that gall bladder cancer cases increase significantly in workers of heptachlor producing factories. Although there were no fatal cases for liver and gallbladder cancer, fatal cerebrovascular diseases were frequently observed.

IARC classified Heptachlor as a possible human carcinogen. Table 21 shows former use of Heptachlor. Heptachlor was banned in 1979.

Table 21 Use of Heptachlor in the past

Name of pest	Active ingredient	Formulation	Dosage
Anisoplia spp.	Heptachlor	WP	500 g / 100 kg seed
Zabrus spp	Heptachlor	WP	300 g / 100 kg seed
Polyphylla fullo	Heptachlor	WP	20 kg / hectare

Toxaphene is a non-systemic and contact effective insecticide. It becomes bio-concentrated in aquatic organisms. It can be carried through the atmosphere.

High frequency chromosome aberration was observed on eight female workers, who had been working on a Toxaphene applied field with 2 kg/ha dosage compared with control group. IARC classified Toxaphene as possible human carcinogen.

Its half-life in soil can vary from 100 days to 12 years depending on the soil type and climate. Table 22 shows former use of Toxaphene. Toxaphene was banned in Turkey in 1989.

Table 22 Use of Toxaphene in the past.

Name of pest	Active Substance	Formulation	Dosage
Stephanitis pyri	Toxaphene	EM	300 cc/ 100 l water

Hexachlorohexane (HCH) is an effective insecticide by contact and in digestive and respiratory systems. It is in a colourless crystalline form. It is a wide spectrum insecticide used in animal ecoparacites, soil endemic insects, public health diseases, and predators. Along with those applications, it can also be used with fungicides in seed applications. Hexachlorohexane was banned in 1985. Table 23 shows former use of it.

Table 23 Use of HCH in the past.

Name of pest	Active ingredients	Formulation	Product applied to 0.1 hectare
Locusts	%6,5 γ –HCH	Powder	2-2.5 kg
Schistocerca gregaria	%2,6 γ – HCH	Powder	5-6 kg
Aiolopus savignyi	%2,6 γ – HCH	Powder	2 kg
Thisoicetrinus pterostichus	%2,6 γ – HCH	Powder	2 kg
Dociostaurus maroccanus	%2,6 γ – HCH	Powder	2 kg
Pararcyptera labiata	%2,6 γ – HCH	Powder	2 kg
Calliptamus italicus	%2,6 γ – HCH	Powder	2 kg
Acheta deserta	%2,6 γ – HCH	Powder	2 kg
Locusta migratoria	%2,6 γ – HCH	Powder	2 kg
Platycleis intermedia	%2,6 γ – HCH	Powder	2 kg
Bradyporus sp.	%2,6 γ – HCH	Powder	2 kg
Uvarovistia satunini	%2,6 γ – HCH	Powder	2 kg
Isophya spp., *Poecilimon* spp.	%2,6 γ – HCH	Powder	2 kg
Gryllotalpa gryllotalpa	%2,6 γ – HCH	Feed	4 kg/20 kg bran
Penthaleus major Duges.	%2,6 γ – HCH	Powder	1.5 kg
Aelia rostrata Boh.	%2,6 γ – HCH	Powder	2 kg
PEPPER			
Agrotis spp.	γ – HCH	Seed	400 g/10 kg bran
Gryllotalpa gryllotalpa	γ – HCH	Seed	400 g/10 kg bran
TOMATO			
Agrotis spp.	γ – HCH	Seed	400 g/10 kg bran
BEAN			
Agrotis spp.	γ – HCH	Seed	400 g/10 kg bran
CUCUMBER			
Agrotis spp.	γ – HCH	Seed	400 g/10 kg.bran
MELON			
Agrotis spp.	γ – HCH	Seed	400 g/10 kg. bran
CABBAGE			
Agrotis spp.	γ – HCH	Seed	400 g/10 kg bran
CORN			
Agrotis spp.	γ – HCH	Seed	400 g/10 kg. bran
POTATO			
Agrotis spp.	γ – HCH	Seed	400 g/10 kg bran
EGGPLANT			
Agrotis spp.	γ – HCH	Seed	400 g/10 kg bran
ONION			
Phytonomus variabilis	HCH (2,6)	Powder	2500

Status of POPs pesticides in Turkey

After the restriction and ban of use of POPs pesticides in some countries, necessary precautions were taken in Turkey. Starting from 1968 the use of aldrin, dieldrin, heptachlor, DDT, chlordane and toxaphene were restricted. Application of soil with aldrin and heptachlor was forbidden, but application on seed was allowed. There were no restrictions on HCH at those years. However, after some applications, HCH residues were found on weeds and DDT residues were found in straw (Güvener et al., 1974)[6]. In Table 24, 25 pesticides that were banned by MARA are summarized.

Table 24 Pesticides that have been banned in Turkey

Pesticides and other chemicals	Date of Ban
Dieldrin	1971
Aldrin	1979
Endrin	1979
Lindane	1979
Heptachlor	1979
Chlordane	1979
e-Parathion	1979
2,4,5-T	1979
Leptephos	1979
Chlordimeform	1979
Mercury contaning products (methoxyethylmercury chloride, phenyl mercury acetate, phenyl mercury chloride)	1982
Arsenic containing disinfectant	1982
Chlorobenzilate	1982
DDT	(Restriction 1978) 1985
HCH	(Restriction 1978) 1985
Fluorodifen	1987
Chlorpropylate	1987
Dinoseb	1988
Daminozide Alar 85)	1989
Toxaphene	1989
Zineb	1991
Azinphos Ethyl	1996

Table 25 Date and Reasons of Ban for POPs pesticides.

Pesticide name	Date of Ban	Reasons
Aldrin	1979	Harmful effects on human health and environment, carcinogen,
Chlordane	1979	Harmful effects on human health and environment, carcinogen,
DDT	1978 (restricted) 1985	Harmful effects on human health and environment, carcinogen, accumulation in fat tissue,
Dieldrin	1971	Harmful effects on human health and environment, carcinogen,
Heptachlor	1979.	Harmful effects on human health and environment, carcinogen,
Endrin	1979.	Harmful effects on human health and environment, carcinogen,
Toxaphene	1989.	Harmful effects on human health and environment, carcinogen,
Mirex	Not authorized in Turkey.	

[6] Güvener A., Gifter F., Türker O., and Körtimur G., 1974 Plant Protection Bulletin, Research on insecticide levels on foods, vol. 14, No. 3, 229-235.

Import and Export of POPs pesticides

After POPs pesticides have been banned no illegal imports of such products were reported. Imports or production without considering legal obligations have severe penalties. In addition, availability of alternative pesticides to the banned ones prevents any illegal application.

Identified Obsolote Stockpiles and Wastes of POPs Pesticides

According to the official statements, there are only stocks of HCH and DDT. After POPs pesticides had been banned, as a precaution MARA collected the data of the stocks of retailers and firms. Even though the inventory studies have been completed, updating studies have been continued and new stockpiles have been come up sometimes. In recent studies, nearly 3,000 tons of HCH (hexachlorobenzene) stockpiles have been found in the stocks in Turkey. The HCH stock is located in İzmit's Derince County, near Şirintepe. HCH is kept in 50 kg nylon bags and barrels in the storage facility of Merkim Industrial Products Co. in the form of white powder. This material was imported by Agricultural Protection Chemicals Co. for agricultural purposes in early 1980s. Because of harmful effects on human health and environment, HCH was banned in 1985 by Plant Protection and Agriculture Quarantine Law. The DDT stock is found in the storage of Ankara Central Service Directorate of MARA. Within the years of 2008-2009, the portion of 314,440 kg of the HCB stocks was send by Merkim Industrial Products Co.to abroad for disposal. 10,930 kg DDT taken from the storage of the Ankara Central Supply Directorate and 130 kg DDT taken from the storage of the Gaziantep Provincial Directorate of the Ministry of Agriculture and Rural Affairs and BHC again taken from the storage of the Gaziantep Provincial Directorate were sent to be disposed to İzaydaş Company in İzmit.

Present Management (production, use, stockpiles and waste) of POPs Pesticides and Empty Containers

Use and production of POPs pesticides are not legally possible and no incident of use or production has been recorded. As mentioned before, regular inspection of residues in food products, soil, rivers, and control of possible users should be undertaken to determine contaminated fields and any illegal use and import of POPs pesticides.

Experts in Plant Protection Central Research Institute, which is under the jurisdiction of Ministry of Agriculture and Rural Affairs, organizes training programs for the staff of City Directorate of Agriculture about physical and chemical properties of registered pesticides, residue problems, their safe use, the importance of proper use, and effects on human health and environment. These education programs are organized at least twice a year at the minimum. The aim of these programs is the training of technical staff and spreading this information to farmers and pesticide retailers.

Assignment of Responsibility and Liability

There are many regulations, communiqués, and standards that have been in force about pesticides. In accordance with the developments, needs and newly occurred situations, these regulations were amended occasionally. Chronologically these regulations are,

1. Plant Protection and Quarantine Law, Official Gazette 24th May, 1957,no: 9615
2. Directive for Pesticide and Equipment Used for Pest Management, Official Gazette: 4th Feb., 1959, no: 10126
3. Directive for the Toxicological Classification of Pesticides

4. Regulation for the National Commission of Codex Alimentarius Official Gazette: 7th Feb.,1994 no: 18152 (changed by O.G. 13th Sep.,2004 no:25582)
5. Regulation for the Control of the Pesticides Official Gazette: 22nd June,1995 no:22321
6. Directive Concerning the Method and Principles of Registration of Pesticides and Similar Products Used in Plant Protection Official Gazette: 17th Feb.,1999 no:23614
7. Regulation for the Labelling of Pesticides Official Gazette: 1st Sep.,1983 no:18152
8. Regulation for The Wholesale, Retail And Storage of Pesticides Official Gazette: 21st Aug., 1996 no: 22734
9. Regulation for the Quality Control Analysis of Pesticides done by the Private Laboratories Official Gazette: 23rd Sep.,2002 no:24885
10. Communiqué to Ban the Use and Marketing of Certain Active Substances used in the Production of Pesticides Official Gazette: 16th Dec.,2003 no:25318

Only the names of standards and regulations regarding organochlorine pesticides are presented in this section. "*Communiqué to Ban the Use and Marketing of Certain Active Substances used in the Production of Pesticides*" was prepared in accordance with *"Directive Concerning the Method and Principles of Registration of Pesticides and Similar Products Used in Plant Protection"*, "*Plant Protection and Quarantine Law"* and *"Law for Preparation and Application of Technical Legislation Regarding The Products Determined in Law No:4703".* This communiqué determines the procedure and principles of banning the use and trading of the plant protection products that contain specific active ingredients. Mentioned communiqué does not apply to plant protection products that will be used for research or used in export products. The appendix of this communiqué includes a list of active ingredients. Ministry of Agriculture and Rural Affairs foresees the prohibitive measures for the use and trading of the products containing one or more of those active ingredients.

According to this communiqué, mercury compounds (mercury oxide, mercury chloride, other inorganic mercury compounds, alkaline mercury compounds, alcoxyalcyl and aryl mercury compounds), permanent organochlorine compounds (aldrin, chlordane, dieldrin, DDT, endrin, less than 0 – 99.0% γ isomer containing HCH, heptachlor, hexachlorohexanee), other compounds (ethylene oxide, nitrofen, 1,2 – dibromomethane, 1,2 – dichloroethane, dinoseb, its acetate and salts, binapacryl, captafol, dicofol containing DDT or other related DDT compounds more than 1g/kg or p p,1 – dicofol less than 78 %, quintozene containing pentachloro benzene more than 10 g/kg or HCH more than 1 g/kg) were banned.

According to the same communiqué, if an alert concerning agricultural production was raised and there were no other ways of controlling this situation, MARA may allow the use and trade of a plant protection product containing one or more of the active substances mentioned above for a maximum of 120 days.

Below, is the list of ISO standards that are corresponding Turkish standards for POPs and other pesticides.

- ISO Guide 34: 2000: General requirements for the competence of reference material producers (available in English only)
- ISO Guide 35:1989: Certification of reference materials – General and statistical principles
- ISO 257:1988: Pesticides and other agrochemicals – Principles for the selection of common names
- ISO 765:1976: Pesticides considered not to require common names
- ISO 1750:1981: Pesticides and other agrochemicals – Common names
- ISO 3890 – 1: 2000: Milk and milk products – Determination of residues of organochlorine compounds (pesticides) – Part 1: General considerations and extraction methods

- ISO 3890 – 2: 2000: Milk and milk products – Determination of residues of organochlorine compounds (pesticides) – Part 2: Test methods for crude extract purification and confirmation
- ISO 4389: 2000: Tobacco and tobacco products – Determination of organochlorine pesticide residues – Gas Chromatographic method
- ISO 6466:1983: Tobacco and tobacco products – Determination of dithiocarbamate pesticide residues – Molecular absorption spectrometric method
- ISO 6468: 1996: Water quality – Determination of certain organochlorine insecticides, polychlorinated biphenyls and chlorobenzenes – Gas chromatographic method after liquid – liquid extraction
- ISO 10382: 2002: Soil quality – Determination of organochlorine pesticides and polychlorinated biphenyls – Gas chromatographic method with electron capture detection (standard preparation is taken into work plan)
- ISO 14181:2000: Animal feeding stuffs – Determination of residues of organochlorine pesticides – Gas chromatographic method (available in English only)
- ISO 16133: 2004 Soil quality – Guidance on the establishment and maintenance of monitoring programmes (standard preparation is taken into work plan)
- ISO/IEC 6522:1922: Information technology – Programming languages – PL/1 general purpose subset (available in English only) (standard preparation is taken into work plan)
- ISO /IEC ISP 12059 – 2: 1995 Information technology – International Standardized Profiles – OSI Management – Common information for management functions – Part 2: State management (available in English only) (standard preparation is taken into work plan)
- ISO/ TR 15916: 2004 Basic considerations for the safety of hydrogen systems (available in English only) (standard preparation is taken into work plan)

Inventory of POPs pesticides in Turkey is given in relevant sections. This information is gathered from MARA. It is clear that POPs pesticides that are in stocks should be disposed of in the short run. Disposal could be done by İzaydaş Company in İzmit. Difficulties may arise due to having only one company for disposal process. As a result, disposal could not be carried out and storage is preferred to prohibit the use of those pesticides, although it is not a safe choice. To proceed for disposal, financial support is needed.
Studies on residue amounts on soil, water, air, food, and human are carried out from time to time and data are obtained in a number of laboratories of MARA. On the other hand, more research work are required to determine the current situation.

General Assessment

The Environmental Law No. 2872 manages identification, responsibilities, and rehabilitation of the contaminated areas. Details of it are in the Report of the National Chemical Profile Task Team.

For Turkey in order to take necessary measures about POPs, determination of contaminated areas, condition of POPs stocks, amount of used POPs, accurate and reliable formation of the inventories, regarding to administrative and technical infrastructure must be undertaken. In this regard, surveys that were prepared by the task team are sent to the organizations, institutions, and industrial corporations, in addition to literature review. Analyses of the data gathered were presented in this report.

Educational studies should become available for releasing information to the public in order to maintain public consciousness on POPs.

Sampling is necessary in order to decide on the most suitable method for determining the amount of contamination in POPs and contaminated areas, POPs and contaminated waste oil and their disposal.

There several important issues which are identification of establishments having the production capacity of by-products of unintentionally produced POPs in Turkey, finding the suitable instruments for this identification and arising the awareness and the ability for authorization and decision making mechanisms of provincial and competent authorities who are responsible for implementation and the manufacturers who have to take any measures and determine whether their establishments are in the scope of the Major Industrial Accidents Plants.

Country priorities regarding determination of contaminated areas by Persistent Organic Polluters and their disposal should be identified and plans and programs should be formed.

In this report, some equipment containing PCBs are known by the private sectors. However, their inventories are difficult to obtain and therefore not sufficiently included in this report and their locations need further studies for contamination[7].
Exchange of information between the members of POPs Task Teams was maintained.

2.3.2 Assessment with respect to PCBs (Annex A, Part II Chemicals)

Polychlorinated Biphenyls (PCBs) are organic compounds, which were used in electrical machinery and equipment insulation. They have been used as insulators in transformer and in capasitors for years and some of the transformers and capacitors in start-up santrals in Turkey contain PCBs. PCBs also appear as by-products of organochlora productions like PVC production and (unwanted) waste incineration.

Stockholm Convention was signed by 172 countries, including Turkey. With this Convention, participating countries jointly agreed to reduce the amount of 12 persistent organic polluters, including PCBs, in the environment, to destruct them and to restrict their sources. According to the Convention, participating countries should,

- ban the use of PCB-containing equipment,
- perform detection, labeling and ban the use of equipments that contain 50 ppm or more PCBs,
- avoid the trade of PCB-containing equipments,
- ban the recycling of equipments that contain 50ppm or more PCBs,
- succeed with the environmentally safe management of PCB-based wastes until 2010.

In order to create an inventory for PCB stocks and PCB-containing equipments, possible holders and users of such stocks and equipments are determined. After obtaining the information two

[7] Baştürk, Ö. et al; 1980. Marine Pollution Bulletin.Vol.11, pp.191-195.; "Land-based Sources of Pollution along the Black Sea Coast of Turkey: Concentrations and Annual Loads to the Black Sea" Gaye Tuncer et al; 1998. Marine Pollution Bulletin.Vol.36, pp.409- 423;

Kurt, P.B. and Özkoç, H.B.; 2004. Marine Pollution Bulletin 48, 1076-1083;

Ünlü, K., METU, Environment Engineering Department & Avcı, B.C.; March 2004. Bosporus University, Merkim Industry A.Ş. Preliminary Feasibility Study at the store in İzmit for Elimination of Duration Time Ended Pesticides,

COELHAN, M. and H.Barlas; 1998. Environ. Bull 7:388-395;

official inquiries regarding stocks and equipments were sent on two different dates. The inventory presented here are the results obtained from the responses of those companies during inquiry.

History and place of use of PCBs

First synthesis of PCBs was made in 1864. Its Commercial production started in 1929/30. PCBs;

- Do not crystallise at low temperatures,
- Are resistant to fire,
- Steam pressure are very low ($4x10^{-5}$-$6.7x10^{-7}$ torr),
- Electrical conductivity is very low,
- Are resistant to thermal shortcuts,
- Do not have explosion risk when combined with air, even though they are heavier than air in their gas state.
- Have high chemical stability, (test results show that when subjected to some active metal and oxygen chemical structures of PCBs does not change up to 170 $^{\circ}$C.)
- Do not dissolve in water. (they dissolve in fats and hydrocarbons)
- Because of these unmatched properties, PCB containing liquids have been used in many places, such as,
- Transformers and large capacitors,
- Heat transmission and hydraulic systems,
- Vacuum pumps,
- Balance capacitor of florescent lamps,
- Paint, adhesive, carbonless copying paper production,
- Lubrication and cutter grease.

They were widely used in indoor transformers due to their resistance to fire. It was determined that PCBs and side products after partial burn, accumulate in human body and have toxic effects. As a result, the use of PCBs was restricted; for example, 24 OECD countries decided to restrict the use of PCBs in 1973. According to this decision, PCBs were allowed to be used in,

- Isolation liquid in transformers and capacitors,
- Heat transfer liquid (except for the production of food, medicine, feed and veterinarian products),
- Hydraulic liquid in mining,
- Small capacitors.
- Again, in 1973 OEDC decided,
- Production, import and export of PCBs should be monitored,
- Research should be done for safe recycling, regeneration and disposal,
- Research should be done for proper labeling,
- Settling on the properties of safe containers for PCBs and their transportation.

In 1987, except for some special cases like standard preparation, OECD banned the production, import, and export of PCBs. In addition, OECD advised that wastes containing PCBs more than 100 ppm must be disposed of in high temperature waste disposal facilities.

After transformer accidents in USA and France, mineral greases, silicone greases and penchlorine ethylene replaced PCBs.

Due to their aromatic structure, chlorine content, and accumulative behavior in human body, it can be said that these are high-risk chemical materials. As opposed to this, when used in closed systems they have no adverse effect on humans and environment.

Harmful effects appear when contaminated food and drinks are consumed; smelled, swallowed or contacted with the skin. When complete burning was not achieved Polychlorine dibenzo furan (PCDF) and Polychlorine dibenzo paradioxsine (PCDD) appear as by-products, which have more harmful effects.

Present Regulations Pertaining PCBs

There are someregulations related to PCBs in Turkey;

1. By-law relating to Restrictions on the Manufacturing, Marketing and Use of Certain Dangerous Substances, Preparations and Articles (Official Gazette: 26th Dec, 2008, no:27092)
2. By-law on Hazardous Waste Control (Official Gazette: 14 March 2005, No. 25755)
3. By-law on Waste Oils Control (Official Gazette: 30 July 2008, No. 26952)
4. By-law on Control of Soil Pollution (Official Gazette: 31 May 2005, no. 25831)
5. By-law on the Control of Air Pollution Arising From Industrial Facilities published (Official Gazette: 22 July 2006, No: 26236)
6. By-law on PCB/PCT (Official Gazatte: 27 December 2007, No: 26739)
7. By-law on General Principles of Waste Management (Official Gazette: 5 July 2008, no. 26927)
8. By-law Control of Soil Pollution and Point-Source Contaminated Sites
9..By-lawon Control of Polychlorinated Biphenyls and Polychlorinated Terphenyls (Official Gazette: 27th Dec, 2007, no:26739)

There are some ISO and EN standards related to PCBs. Detailed information about these standards was given in page 20-23.

- Banning of production, import, export and usage of PCBs, listed among the 12 dangerous chemicals covered by the Stockholm Convention, as well as the equipment containing them (transformers, capacitors), including their labeling, identification and disposal, are within the obligations of Turkey.

- In order to prevent possible harms inflicted on human health and environment by the PCBs, detailed by-law was prepared for addressing licensing of PCB containing equipment and legal and penal responsibilities. Feedback had been received from the relevant agencies and the by-law was published at the end of 2007.

Closed and Semi-closed Applications of PCBs

Major sources and users of PCBs are the power generation, transmission and distribution industries. As of our knowledge, PCBs have been found only in closed applications in Turkey. There is no information about any source or any use of semi-closed applications of PCBs. In this section the inventory of PCB containing transformers and capacitors were listed in detail. At the end of this section, estimation on use of PCBs is given for an estimate number of equipment in Turkey.

To have a complete PCB inventory, two official inquiries were sent to the possible PCB equipment holders and users, one on July and the other one on September in 2004.

As response to those letters, some companies and foundations had reported their PCB equipment inventory, some reported that they had no PCB stocks and had no PCB- containing equipments. Still there are some companies that have not responded. In addition to the official inquiries, a table of trade names and synonyms for PCB mixtures was also sent to the companies and foundations.

PCB containing products are available in many commercial brands; some well-known brands are listed in Table 26. Aroclor is coded as 1242, 1248, 1254, and 1260. First two numbers represent the biphenyl content; last two numbers represent the chlorine percentage by weight.

Table 26 Trade Names and Synonyms for PCBs Mixtures

Aceclor (t)	Cloresil	Montar
Adkarel	Clorphen (t)	Nepolin
ALC	Delor (Czech Rep.)	Niren
Apirolio (t,c)	Diaclor (t,c)	No-Famol
Aroclor (t,c) (USA)	Dialor (c)	No-Flamol (t,c) (USA)
Aroclor 1016 (t,c)	Disconon (c)	NoFlamol
Aroclor 1221 (t,c)	Dk (t,c)	Nonflammable liquid
Aroclor 1232 (t,c)	Ducanol	Pheneclor
Aroclor 1242 (t,c)	Ducanol (c)	Phenoclor (t,c) (France)
Aroclor 1254 (t,c)	Dykanol (t,c) (USA)	Phenochlor
Aroclor 1260 (t,c)	Dyknol	Phenochlor DP6
Aroclor 1262 (t,c)	EEC-18	Plastivar
Aroclor 1268 (t,c)	Electrophenyl T-60	Pydraul (USA)
Areclor (t)	Elemex (t,c)	Pyralene (t,c) (France))
Abestol (t,c)	Eucarel	Pyranol (t,c) (USA)
Arubren	Fenclor (t,c) (Italy)	Pyrochlor
Asbestol (t,c)	Hexol (Russian	Pyroclor (t) (USA)
ASK	Hivar (c)	Saf-T-Kuhl (t,c)
Askarel (t,c) (USA)	Hydrol (t,c)	Saft-Kuhl
Bakola	Hydrol	Santotherm (Japan)
Bakola 131 (t,c)	Hyvol	Santotherm FR
Biclor (c)	Inclor	Santoterm
Chlorextol (t)	Inerteen (t, c)	Santovac
Chlorinated diphenyl	Kaneclor (KC) (t,c)	Santovac 1
Chlorinol (USA)	Kaneclor 400	Santovac 2
Chlorobiphenyl	Kaneclor 500	Sinclonyl (c)
Clophen (t,c)	Keneclor	Solvol (t,c) (Russian Federation)
Clophen – A30	Kennechlor	Sovol
Clophen – A50	Leromoll	Sovtol (Russian Federation)
Clophen – A60	Magvar	Therminol (USA)
Clophen Apirorlio	MCS 1489	Therminol FR

t: transformer
c: capacitor

PCBs Uses

PCBs have been employed in a multitude of applications, many of which are still in use today, including dielectric fluids in electrical equipment, heat-transfer fluids in mechanical operations, plasticizers, lubricants, inks, and surface coatings.Generally,closed and partially closed systems contain PCB oils or fluids. The PCBs in open systems take on the form (type of media) of the

product they have been used in as an ingredient. Therefore, PCBs in open applications may be found in forms ranging from paint, to plastic, to rubber (Table 27).

Table 27. Sources Possibly Containing PCBs

SOURCE	Possible PCB-Containing Applications
Electric Utilities (including distribution networks)	Transformers Large Capacitors Small Capacitors Switches Voltage Regulators Liquid Filled Electrical Cables Circuit Breakers Lighting Ballasts
Industrial Facilities (including aluminum, copper, iron and steel, cement, chemicals, plastics, synthetics, and petroleum refining industries)	Transformers Large Capacitors Small Capacitors Heat Transfer Fluids Hydraulic Fluids (equipment) Voltage Regulators Circuit Breakers Lighting Ballasts
Municipalities, water treatment and distribution networks, waste water treatment plants, street lightings	Vacuumed pumps, Submerged pumps, Small capacitors, Voltage Regulators
Animal Husbandry, dairy farms/miking sheds, trimming farms	Small and big size capacitors, Voltage regulators, Submerged pumps
Railroad Systems	Transformers Large Capacitors Voltage Regulators Circuit Breakers
Underground Mining Operations	Hydraulic Fluids (equipment) Earthing Coils
Military Installations	Transformers Large Capacitors Small Capacitors Circuit Breakers Voltage Regulators Hydraulic Fluids (equipment)
Residential/Commercial Buildings (including hospitals, schools, households, offices, and stores)	Small Capacitors (in washing machines, hair dyers, neon tubes, dishwashers, power supply units,etc.) Circuit Breakers Lighting Ballasts
Research Laboratories	Vacuum Pumps Fluorescent Light Ballasts Small Capacitors Circuit Breakers
Electronics Manufacturing Plants	Vacuum Pumps Lighting Ballasts Small Capacitors Circuit Breakers

It is often useful to know the source of PCB materials used in various applications. Although trade names for PCB mixtures are not specific to applications, the inclusion of a particular mixture may help to identify useful information for management of PCBs or PCB-containing materials. Trade names for PCB mixtures will most likely only be useful for identification purposes with closed and partially closed applications where equipment labels and manufacturer literature provides information on PCB mixtures. Annex A, Table A.4 provides a comprehensive list of PCB mixture trade names. In the case of open applications, most often the containers that held the original mixtures have been discarded. Thus, in the absence of labels and written indications, open applications often need to be tested for PCB presence (Table 28).

Table 28. Open Applications of PCBs

Lubricants • Immersion oils for microscopes (mounting media) • Brake linings • Cutting oils • Lubricating oils • Natural gases compressors Casting Waxes • Pattern waxes for investment castings Surface Coatings • Paints • Surface treatment for textiles • Carbonless copy paper (pressure sensitive) • Flame retardants ceiling surface furnitures and walls • Dust Control • Asphalt • Dust Holder • Natural gases pipe line	Adhesives • Special adhesives • Adhesives for waterproof wall coatings Plasticizers • Gasket sealers • Filling material in joints of concrete • PVC (polyvinyl chloride plastics) • Rubber seals Inks • Dyes • Printing inks Other Uses • Insulating materials • Pesticides

Source: Guidelines for the Identification of PCBs and Materials Containing PCBs, UNEP, 1999

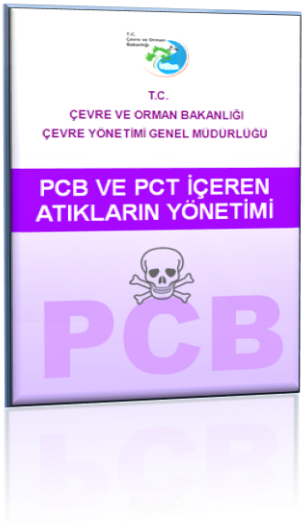
PCBs- containing Wastes and related activities

Due to the size of Turkey also when limited financial human resources and time were added whole of the country could not be covered by a field search. Table 29 is prepared according to the companies' responses to the official letters. However, it could not be possible to come up with ab estimate for the whole country. The quantities of PCBs and PCBs containing equipment are given in Table 29A as a preliminary information. Future data regarding other transformers and equipment will be supplied within the inventory to be submitted later.

In Table 29 the results were be obtained by the letters from the official surveys distributed in the result of a major effort by the relevant officials. The total number of distribution transformers is 335.099. 160.728 of those belong to TEDAŞ, while the remaining 145.480 belong to third parties. Of the transformers belonging to TEDAŞ, 139.509 have been scanned through the label reading method only, while 100 of them were scanned though the analysis method using test kits. As a result of these scans, no PCBs containing transformers were encountered. According to the records, the total number of PCBs contaminated transformers are 290, while there are in total 1.972 such contaminated capacitors. It shall be necessary for the exact numbers of the PCB containing equipment to be notified by the organizations within a short period of time to the Ministry of

Environment and Forestry within the scope of the 'Regulation for the Control of PCB and PCT Containing Wastes', which came into force upon being published in the Official Gazette No. 267395 dated December 27, 2007, the public and private sector PCBs and PCB containing equipment inventories shall be determined with accuracy.

By-law on PCB/PCT was published in the Official Gazatte dated 27 December 2007 and no 26739. The purpose of this By-law is to establish the administrative and technical procedures and principles for the definitive disposal of used polychlorinated biphenyls (PCB) and polychlorinated biphenyl-containing materials and equipment without endangering human health and harming the environment. This By-law covers preparation of the inventory, temporary storage, transportation, decontamination, disposal of polychlorinated biphenyls (PCB) and polychlorinated biphenyl-containing materials and equipment as well as limitations and obligations concerning the import and export, measures to be taken, inspections to be made, related legal and criminal responsibilities for PCB and PCB-containing materials and equipment.



The Ministry of Environment and Forestry published PCB Hand-book and brochure in order to inform the Provincial Directorates of the Ministry and other stake holders (private sector dealing PCBs, maintenance and repair centers, relevant institutions) about the PCBs. One can reach this hand-book via this website (http://www.atikyonetimi.cevreorman.gov.tr/belge/PCB.pdf).

Table 29. PCB Containing Transformers at EUAS, based on the replies given to written inquiries (2007)

	Transformer Brand (Power in KWA)	No. Of Transf.	Commercial Name of Isolation Liquid	Year of Manu-facture	Year Transfomer Entered Into Service	Weight of Isolation Liquid (kg)	Total Weight of Transformer (kg)	Transformer in operation/idle (Active/Idle)
SEYİTÖMER T.S (41 UNITS) (KÜTAHYA)	AEG ETİ (1000KWA)	8	Clophen	1971	1973	1386	4090	Active
	AEG ETİ (1000KWA)	4	Clophen	1975	1977	1400	4000	Active
	AEG ETİ (1600KWA)	1	Clophen	1971	1974	2110	5980	Idle
	AEG ETİ (1600KWA)	2	Clophen	1971	1974	2110	5980	Active
	AEG ETİ (400KWA)	2	Clophen	1976	1977	710	2000	Active
	ESAŞ (1250 KWA)	2	Clophen	1976	1977	1410	4500	1active, 1 idlel
	ESAŞ (1250 KWA)	2	Clophen	1976	1977	1540	4890	Active
	AEG ETİ (400KWA)	1	Clophen	1971	1973	710	1700	Idle
	ESAŞ (630 KWA)	4	Clophen	1975	1977	980	2680	Active
	AEG ETİ (315KWA)	2	Clophen	1973	1977	375	1660	Active
	AEG ETİ (315KWA)	2	Clophen	1973	1977	470	1660	Active
	ESAŞ (200 KWA)	1	Clophen	1976	1977	500	1380	Idle
	Of.Elec.Tech. (25 KWA)	2	Clophen	1971	1973	100	260	Active
	ACE-6 (25 KWA)	1	Clophen	1971	1974	100	260	Idle
	AEG ETİ (250KWA)	3	Clophen	1976	1977	100	260	1I dle,2 active
	Rhone Alber Elec. (100 KWA)	2	Pyralene	1975	1977	200	750	Active
	Marelli (900 KWA)	2	Askarel	1971	1973	2660	6690	Active
*AMBARLI (6 UNITS) (İSTANBUL)	General Elect. (750 KWA)	4	Pyranol		1967	530 Lt	2766	Active
	Westinghouse (750 KWA)	2	İnerteen	1968	1970	716 Lt	2786	Active
DOĞANKENT (2 UNITS) (GİRESUN)	Oy Stromberg (400 KWA)	2	Clophen	1966	1971	400	2650	Idle
	TOTAL	**49 units**				44.088kg +2836lt	**148.316kg**	**41 in service 8 idle**

* A contract has been signed to disposal of 43 transformers in these santrals. In near future, 6 transformers will be remain in Ambarlı Santral.

Table 29A. A preliminary list of PCBs and PCB containing equipment examined and discarded, carried out by certain organizations for inventory purposes.

Organization	Equipment examined and identified for inventory	Number of equipment	Number in service and idle	Number discarded
EUAS	Transformer	187	6 in service 43 out of service	136
TEIAS	Capacitor,	1972 capacitors	All in service	-
TEDAS	Label studies on 145.480 Transformers	-	-	-
Turkish Sugar Factories Co.	Transformer	60	All in service	-
ERDEMIR Iron-Steel Factory	Transformer	20	All in service	-
RENAULT Automobile Factory	Transformer	5	-	5
BRISA Tire Factory	Transformer	13	All in service	-

Turkish Sugar Factories Company[8]					
Transformer Brand	Location	Technical Characteristics	Oil Weight Kg/number	Total Weight Kg/number	Number
AEG-ETİ	Afyon	6.3 / 0.4 KW Power: 1.250KWA	1.450	4.670	10
Elektro-Mekanik	Afyon	6.3 / 0.4 KW Power: 1.250KWA	800	4.100	3
AEG	Eskişehir	6.3 / 0.4 KW Power: 1.250KWA	1.450	4.720	1
AEG-ETİ	Turhal	6.3 / 0.4 KW Power: 1.250KWA	1.450	4.720	11
TOTAL			5.150		25

Legitimate disposal methods for PCBs and PCB contaminated equipment are mentioned in the regulation such as,

- burning,
- using as a fuel or performing other ways of energy production,
- reshaping/reforming of metals and metal compounds,

Regulatory (legislation) states some properties for the combustion facilities to burn PCBs;

[8] 25 transformers have been procured in 2005 for the replacement of the PCB containing transformers located at Afyon, Eskişehir and Turhal Sugar Factories. Disposal of these 25 PCB containing transformers have been realized in 2006.

Oil discharges of the 25 transformers located at Afyon, Eskişehir and Turhal Sugar Factories, and in the case of PCB containing oil leaks, PCBs disposal through cleaning of the concrete and soil foundations with special chemical agents, as well as their crushing, stripping and transport, have been carried out in 2006. Transport and disposal activities have been completed on 31.10.2006, in accordance with the principles of the **Regulation for the Control of Hazardous Wastes** published in the **Official Gazette no. 25755** dated **March 14, 2005.**

Replacement of the remaining 35 PCBs containing transformers and full disposal of PCBs at the company will be completed until 2025.

- A final combustion room should be present along with other combustion rooms,
- Minimum temperature should be 900^{o}C in the first chamber of the combustion oven,
- Regular collection of temperature data,
- An additional burner in the final combustion chamber,
- Automatic operation of burner when minimum temperature threshold passed,
- Minimum temperature should be 850^{o}C and for higher than % 1 halogen containing compounds temperature should be 1100^{o}C at this chamber,
- During the incineration minimum waste holding should be 2 seconds.

General Assessment of Inventory of PCBs

Information on inventory of PCBs and PCBs containing equipments in Turkey is given in relevant section. It was prepared with the information from relevant foundations and companies. In Turkey the only company that can perform destruction is İzaydaş Co., located in İzmit. However its technology is not on the desirable level needs further development. The cost of destruction in 2004 by İzaydaş is given as 2000 €/ton. In addition, there will be additional expenses for transportation and storage etc. that will increase the overall cost. This costly process could not be performed because of the economical difficulties in the country. As a solution, international financial support can be recommended for the adapting new technology.

Wastes disposed by İZAYDAŞ A.Ş. and amounts of wastes listed in the Annex 4 "list of substances and equipments possibly containing PCB" of the By-law on PCB/PCT are given in Table 30.

Table 30. Wastes Disposed by İZAYDAŞ A.Ş. (1997-2007)

Type of Waste	Amount (tons)
Transformer oil	56,91
Transformers	26,65
Agricultural Chemicals	44,16
Resins	293,24
Cables	27,18
Electricity Equipments	0,74
TV Tubes	244,02
Cutting Oils (Boron Oils)	561,80
Hydraulic Oils	386,96
Dyes-Varnish	2013,05
Total	3654,71

PCBs and PCBs containing equipment have never been produced in Turkey; they were imported from other countries. These factors should also be considered for the evaluation of PCBs contamination. Alternatively, İZAYDAŞ choses the exportation of wastes containing PCBs as an another disposal way (Table 31).

The awareness rises in the companies for PCBs disposal and more efforts are made to dispose of PCBs containing equipments and training on this subject.

During these conducted activities in 8 regional workshops in 8 regions selected by the National Project Coordinator, national experts and participants for the regional training and the development

of the national strategy which are explaned in details in the Supplemental to Contract No. 2003/111 UNIDO Project No. GF/TUR/03/008.

Table 31. Exported Amount of Wastes Containing PCBs (1997-2008)

YEAR	ELW CODE	TYPE OF WASTE	AMOUNT (tonnes)	DISPOSAL METHOD	IMPORTER COUNTRY	IMPORTER COMPANY
1997	Y10	LIQUID	110,00	R2/R3	GERMANY	
1998	Y10	LIQUID	0,40	D10		
1999	N/A					
2000	Y10	LIQUID	36,00	D10		
	Y10	CONTAMINED WASTE	260,00	D9	GERMANY	
	Y10	SOLID	75,00	D9	GERMANY	
	Y10	EQUIPMENT	30,00	D9	GERMANY	
2001	N/A					
2002	Y10	EQUIPMENT	0,01	D10	GERMANY	
2003	Y10	EQUIPMENT	10420,00	D12/D15&D10	GERMANY	
2004	N/A					
2005	Y10	EQUIPMENT	500,00	R4	GERMANY	ABB
	Y9	LIQUID	2156,50	D10	GERMANY	
	Y10	LIQUID	300,00	D10	GERMANY	
2006	Y10	SOLID	743,00	D10	GERMANY	ABB
		LIQUID	500,00	D10	GERMANY	
		EQUIPMENT	300,00	R4	GERMANY	
2007	N/A					
2008	Y10	LIQUID	17,74		FRANCE	APROCHIM.SA
	Y10	EQUIPMENT	8,56		FRANCE	APROCHIM.SA
	Y10	SOLID	8,62		FRANCE	APROCHIM.SA
	Y10	EQUIPMENT	8,76		FRANCE	APROCHIM.SA
	Y10	SOLID	9,50		FRANCE	APROCHIM.SA
	Y10	SOLID	8,54		FRANCE	APROCHIM.SA
	Y10	LIQUID	19,90		FRANCE	APROCHIM.SA
	Y10	SOLID	8,52		FRANCE	APROCHIM.SA
	Y10	SOLID	9,72		FRANCE	APROCHIM.SA
			15531			

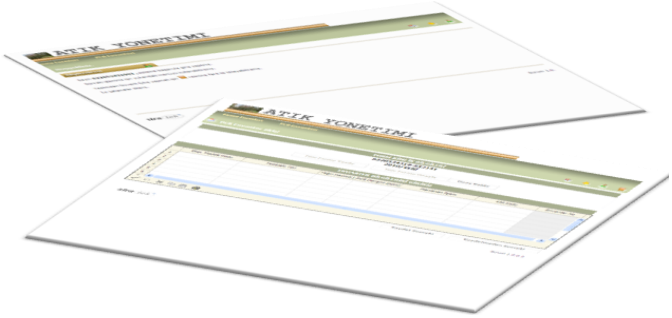
Within in the scope of the Twinning Project TR/2004/IB/EN/01 for strengthening the capacity of Turkey in the field of Special Waste, which is a joint project of the Turkish Ministry of Environment and Forestry and the German Ministry of Environment, Nature Conservation and Nuclear Safety, inventory analysis regarding to PCBs in 6 cities including Ankara, İzmir, Afyon, Yozgat, Kayseri and Konya was carried out and transformers and capacitors in the 4 cement and 4 sugar factories located in 5 cities were examined; in additional to these, 3 maintanence and repair plants of the Ministry of Energy were visited. According to the inventory information reached, the total amount of capacitors were 30 and transformers were 129. In the scope of field studies, isolation oils samples collected from the transformers were tested duly with simple test kits and the levels of the PCBs were higher than 50 ppm. The results of 5 tests out of 8 tests showed that the PCBs levels were very close to 50 ppm limit value.

In this twinning project, theoretical calculations considering the abroad applications showed that the possible amount of substances and equipments containing PCBs were 140,000 tons in Turkey (Table 32).

Table 32. Possible amount of PCBs and PCBs containing equipments in Turkey

Type of Equipment	Possible Amount of Equipment	Mean Weight (kg/units)	Possible Total Amount (Tons)
Transformers containing PCBs	18750	2,5	46,000
Transformers contaminated with PCBs	37500	2,5	93,000
Capacitors containing PCBs	18750	50	1,000
Total Equipments containing PCBs	75	-	140,000

According to the By-law on PCB/PCT, holders of materials and equipment containing 5 dm^3 (L) and more PCB shall ensure that they are recorded in the PCB inventory of the Ministry. In case of capacitor sets, the calculation of the threshold value of 5 dm^3 (L) shall be found as the sum of the volumes of each part of the capacitor containing PCB.



With regard to declarations of materials and equipment which are subject of an inventory, the PCB Inventory Form must be used. With the inventory program established in the Twinning Project on Special Wastes, the inventory forms will be filled by PCBs holders via electronically online registration program. The program can allow the stakeholders to apply online registers and make the Ministery of Environment and Forestry to follow the updated data.

2.3.3 Assessment DDT (Annex B Chemicals)

This section of the report consists of a summary of DDT inventory including its production, use, imports, exports and stockpiles and management of DDT. In this report, it can be clearly seen that DDT has been used between 1957 and 1985. Since then, no use (import, export, use, stockpiles, etc.) of this active substance has been reported; moreover, these chemicals are sufficiently managed via a great number of legislations.

History of DDT

Although in past these pesticides were not considered hazardous to human and animal health with standard application doses, their chronic poisoning were found with their persistency and ability to accumulate on fat tissues in the long term. As a result, except for endosulfan, direct application of all organochlorine pesticides to plants was banned in Turkey. It was found that these compounds could pass to plants through soil and water and disinfection of soil was also banned.

In parallel to all these developments, due to their durability, harmful effects on human health and environment, the use, imports and exports of DDT were also banned. Effects of DDT on environment were discussed in "*Contamination Task Team Report*" and effects on human health were discussed in "*Report of the Health Team*".

Institutional and Regulatory Framework

The use of pesticides and similar products, their production, import and exports are carried out by the MARA within the framework of the Plant Protection and Agriculture Quarantine Law No. 6968 and its supplementary bylaws and regulations in Turkey.

All pesticides discussed here except *mirex* was registered and used in many areas of Turkey. International studies on those pesticides reported harmful effects on human health and nature, were possible causes of cancer and had long lasting residues. Use of DDT was restricted in 1978 and totally banned in 1985 in Turkey.

After the banning of POPs pesticides, as precautionary measures, retail sales of these materials has been stopped and stock registers of the companies have been collected by the MARA. According to the reports of MARA, approximately 11 tons of DDT in stocks were sent to İZAYDAŞ to be disposed.

Past, Present and Projected Future Production and Use of DDT

According to the available data and records, there was no DDT production in the past. Use of DDT was restricted in 1978 and banned in 1985 in Turkey. When they were registered, plant protection products were prepared using active ingredients imported from other countries. Reports of Undersecretariat of Foreign Trade and Undersecretariat of Customs support the fact that import and exports of such active ingredients have no records in the statistics.

Nationwide monitoring of organochlorine pesticide residues has been performed on agricultural products, soil, and streams. No illegal use of DDT has been detected.

DDT was widely used during World War II to protect soldiers and civil people from malaria, typhus and other diseases that are carried by vectors. In the post war era DDT use on agricultural products and vector combat continued. Because of the belief of its harmful effects on nature, especially on wild birds, most of the developed countries banned DDT in the beginning of 1970's.

Due to its semi-volatile characteristic, it can be present in atmosphere. It can easily accumulate in the fat tissue of all living organisms; it was even detected in mother's milk. DDT and its related products are very durable in nature, even after 10 - 15 years from its application more than 50 % of them remain in the soil.

Although there is not enough evidence of DDT being carcinogenic, IARC classified it as a possible human carcinogen based on the results of the animal tests. Table 42 shows the former use ratiosImport and Export of DDT

In past, when DDT was registered, its products were exported and imported. After the ban, no illegal trade of such products have been reported. In addition, availability of alternative pesticides prevented any illegal use.

The technical staff of MARA accomplished market surveys and custom controls periodically. There is no data about illegal use or trade of this active substance and/or product.

However, as mentioned before, inspection on food products, soil and rivers for residues should be conducted to determine the contaminated fields and to determine any illegal use of POPs pesticides. Financial support is required for these activities.

Identified Stockpiles of DDT and DDT Waste

As explained in page 54 after the ban on POPs pesticides the stock records of retailers and firms were collected as one of the precautions taken by MARA. 10.930 kg of DDT in the storage of the Ankara Central Supply Directorate and 130 kg of DDT in the storage of Gaziantep Provincial Directorate of the MARA, were sent to İZAYDAŞ to be disposed. Recommended issues, formulation and doses of DTT is given in the table 33 when DDT was registered in Turkey. The detailed information of DDT stocked in Ankara Central Supply Directorate is given in the table 34.

Present Management of DDT and Empty Containers

Experts in Plant Protection Central Research Institute, which is under the jurisdiction of MARA provides training to the staff of Regional Directorate of Agriculture about physical and chemical properties of registered pesticides, residue problems, their safe use, the importance of proper use, and effects on human health and environment. Training programs are given at a minimum twice annually.

Current Capacity and Experience in the Field of DDT

Monitoring studies are periodically executed by the technical staff. According to the available data in İzmir region (Muradiye, Menemen, Bursa, İzmir), DDT residue amounts were less than 0.0015 mg/ kg on tomatoes, cucumber, pepper, peach, apple, grape in 1990. Data of monitoring activities show that there is no use of DDT.

Table 33 Use of DDT in the past.

Name	Active Ingredient	Formulation	Dos
Lobesia botrana	DDT	WP	300 g/ 100 lt water
Lobesia botrana	DDT	Powder	20-30 kg/ ha
Sparganotis pilleriana	DDT	WP	300 g/ 100 lt water
Theresimima ampelophaga)	DDT	WP	300 g/ 100 lt water
Theresimima ampelophaga	DDT	Powder	1-1.5 kg/ 100 lt water
Arctia villica	DDT	WP	300 g/ 100 lt water
Arctia villica	DDT	Powder	20-30 kg/ ha
Otiorrhynchus spp.	DDT	WP	300 g/ 100 lt water
Otiorrhynchus spp.	DDT	Powder	20-30 kg/ ha
Heliothis spp.	DDT	WP	450 g/ 100 lt water
Phyllotrata spp. *Psylliodes* spp.	DDT	WP	300 g /100 lt water
Leafhopper spp.	DDT	WP	230 g/ 100 lt water
Acanthoscelides obtectus	DDT	Powder	25-30 kg/ ha
Pieris spp.	DDT	WP	250 g/ 100 lt water
Bruchus spp.	DDT	Powder	25-30 kg/ ha
Caradrina spp.	DDT	WP	250 g/ 100 lt water
Vanessa cardui	DDT	WP	25-30 kg/ ha
Plusia gamma	DDT	WP	450 g /100 lt water
Phyllotrata spp. *Psylliodes* spp.	DDT	Powder	20 kg/ ha
Stephanitis pyri	DDT	WP	300 g/ 100 lt water
Summer spring (Diaspididae, Lecanidae)	DDT	WP	300 g/ 100 lt water
Cydia pomonella	DDT	WP	300 g/ 100 lt water
Euproctis chrysorrhoea	DDT	WP	300 g/ 100 lt water
Euproctis chrysorrhoae	DDT	Powder	30 kg / ha
Aporia crataegi	DDT	WP	300 g/ 100 lt water
Lymantria dispar	DDT	WP	
Lymantria dispar	DDT	Powder	300 g/ 100 lt water
Anthonomus pomorum	DDT	WP	30 kg /ha
Rhynchites spp	DDT	WP	300 g/ 100 lt water
Eurytoma amyqdali	DDT	WP	400 g/ 100 lt water
Aporia crataeg	DDT	WP	300 g/ 100 lt water
Hoplocampa spp.	DDT	WP	300 g/ 100 lt water
Rhagoletis cerasi	DDT	WP	300 g/ 100 lt water
Syrista parreyssi	DDT	WP, EM	300-600 cc/ 100 lt water
Rhynchites hungaricus	DDT	WP, EM	300-600 cc/ 100 lt water
Agrilus chrysoderes	DDT	WP, EM	500-600 cc/ 100 lt water

* Wetable Powder * EM

Table 34 DDT stocks.

Location	Active ingredient	Commercial Name	Quantity (kg)	Package weight (kg)	Expiration date	Allocation place	Allocation date
Central Log. Dir.	10% DDT	Uviton	5,520	30	1989	Warehouse	N/A
Central Log. Dir.	10% DDT	Korside-7	4,410	30	1989	Warehouse	N/A
Central Log. Dir.	10% DDT	Gamma Trikofon	1,000	25	1983	Warehouse	N/A
TOTAL			10,930				

General Assessment of Inventory of DDT

Information on the inventory of DDT in Turkey is taken from MARA and given in relevant sections. According to the reports of MARA, approximately 11 tons of DDT in stocks were sent to İZAYDAŞ to be disposed.

Studies on pesticide residues in soil, water, air, food, and human are carried out irregularly and data are collected. There are a number laboratories to monitor residues. However, the personnel and equipment infrastructure has to be improved to develop the monitoring system in the whole country.

Preliminary inventory of production, distribution, use, import, and export

Relevant information regarding the import, use, distribution, and export of POPs was given before. Table 35 shows also the estimated figures of POPs pesticides. No production or use of POPs pesticides is foreseen.

Table 35 Summary Forecast of POPs Production, Use, and Unintentional Releases (Tons)

Year	2002/03	2005 (Baseline Inventory)	2010	2020	2030
POPs PESTICIDES					
Production					
Aldrin	-	-			
Chlordane	-	-			
Dieldrin	-	-			
Endrin	-	-			
Heptachlor	-	-			
Hexachlorohexanee	-	-			
Mirex	-	-			
Toxaphene	-	-			
Use					
Aldrin	-	-			
Chlordane	-	-			
Dieldrin	-	-			
Endrin	-	-			
Heptachlor	-	-			
Hexachlorohexanee	-	-			
Mirex	-	-			
Toxaphene	-	-			
DDT					
Production	-	-			
Use	-	-			
PCB					
Production	-	-			
Use					
Closed and semi-closed applications		About 4000 tonnes *			
Open applications	-				

* This preliminary data subject to change and if would be published in a separate cover as soon as new data become available

2.3.4 Assessment of Releases from Unintentional Production of Annex C Chemicals (PCDD/PCDF, HCB and PCBs)

The Stockholm Convention requires all Parties endeavor to collect information and based on this information to develop a National Implementation Plan for meeting its obligations under the Convention. Related with this requirement this section intends to summarize the inventories of the emission of polychlorinated dibenzo-p-dioxins and dibenzofurans (PCDDs/PCDFs) Hexachlorbenzene (HCB) and polychlorinated biphenils (PCBs) which are unintentionally formed in a wide range of thermal and industrial chemical processes. These are the chemical substances covered by Annex C of the Stockholm Convention.

Potential sources are:

- Thermal processes: waste incineration, uncontrolled waste burning, metal smelting, and refining processes, thermal power generation, cement kilns, wood and other biomass burning and transportation fuel combustion.

- Industrial chemical processes: production of pulp and paper when bleaching with elemental chlorine is used.

Development of national inventory made by the Toolkit prepared by UNEP Chemicals, which is an effective methodology for identifying the relevant industrial and non-industrial processes releasing PCDD and PCDF.

It detailed database of emission factors, which provides suitable default data were applied as representative of the class into which the processes are grouped. The main source categories for PCDDs/PCDFs emissions in the Toolkit are identified as:

- Waste incineration
- Ferrous and non-ferrous metal production
- Power generation and heating
- Production of mineral products
- Transport
- Uncontrolled combustion processes
- Production of chemicals and consumer goods
- Miscellaneous
- Disposal
- Hot points

According to the Turkish Dioxin inventory 2162 g TEQ were released into the environment (emission into air, water and soil), The most important POPs producer sectors into air, amount in order are ferrous and non-ferrous metal production (624,7 g TEQ/year or gram toxic equivalent of dioxins per year), production of mineral products (245,6 g TEQ/year), power generation or heating (143,3 g TEQ/year), uncontrolled combustion process (151 g TEQ/year), waste incineration (62,8 g TEQ/year) and transport (21,5 g TEQ/year).

Main releases via solids originate also from the metal industry mainly in ashes (675,4 g TEQ/year).

Since the POPs pesticides were banned, other hazardous chemical were controlled and managed by law. In Turkey, there are no recently identified chemicals at present. This needs further studies by the responsible authorities in Turkey.

In addition, Turkey needs a database for the POPs inventory and sufficient information, technical and financial supports for the analyses of dioxins and furans and BAT (Best Available Techniques) and BEP (Best Environmental Practices). Emergency situation predictions that are important to control the industrial accident, are the integral part of the BAT/BEP applications.

Persistent Organic Pollutants which may have similar effects, are found in all environmental compartments, are persistent and, being fat soluble, tend to accumulate in higher animals, including humans. Their resistance to degradation and semi-volatility means that they may be transported over long distances and give rise to trans-national exchanges of pollutants. In addition, POPs released into the environment many years ago continue to contribute to contemporary exposure. Due to high persistence of POPs, concentrations in soils and sediments decrease very slowly, following any reduction in releases to air and water. Concentrations in air are more responsive to emission reductions, so the POPs emissions can be decreased rapidly in air than in soil or water.

It is possible to say that once released into the environment, all POPs follow a range of similar routes. In the atmosphere they exist in both the gaseous phase and bound to particles, depending upon the environmental conditions, and are deposited on soil, vegetation and water bodies by wet and dry deposition or in mist. Dioxins have been measured in areas with no local sources and it can,

thus, be deduced that they are available for long-range transport over a scale of thousands of kilometers.

This section was prepared by the cooperative use of official and private sector database for different production sectors. The data obtained from official sources such as SIS or SPO are evaluated and compared with some private sector data, so sometimes only official data are used or sometimes they are used together (i.e. For smoke information, official data explain only governmental sales, so public sector sales are evaluated separately). The other information used in the report was obtained from the most reliable private sector companies or NGOs.

The total emissions (air, water, soil, product) of unintentionally produced POPs (dioxin and furane) in Turkey are given in Table 48. According to this table, the most important POPs producer sectors are ferrous and non-ferrous metal production, production of mineral products, waste incineration and power generation.

Ferrous and non-ferrous metal production values are not surprising for Turkey, as most of the European Union Countries (such as Poland and Romania) have same emission values for metallurgical sector. But for the validation of these results, detailed research and investigation are needed for this sector in Turkey.

For PCBs emissions, Turkey has two main problems; lack of information and research on PCBs production and insufficient laboratory facilities for PCBs analysis at different matrices, except for some governmental laboratories. First of all, capacity building efforts for existing laboratories should be supported and later, joint-research projects on contamination and disposal of PCBs should be started in Turkey.

Besides being formed as unintentional by-products of manufacturing or disposal processes, PCDD/PCDF may also be introduced into processes as contaminants in raw materials. PCDD and PCDF releases arise from four types of sources.

Three are considered three processes:

- Chemical production processes – for example the production of chlorinated phenols and the oxychlorination of mixed feeds to make certain chlorinated solvents, or the production of pulp and paper using elemental chlorine for chemical bleaching;

- Thermal and combustion processes – including incineration of wastes, the combustion of solid and liquid fuels and the thermal processing of metals;

- Biogenic processes, which may form PCDD/PCDF from precursors such as pentachlorophenol. The last one is related to previous contamination:

- Reservoir sources such as historic dumps of contaminated wastes and soils and sediments, which have accumulated PCDD/PCDF over extended periods.

In January 2001, UNEP Chemicals within the framework of the IOMC (Inter-Organization Program for the Sound Management of Chemicals) released the "Standardized Toolkit for Identification and Quantification of Dioxin and Furan Releases" as a draft. This Toolkit is for the preparation of a release inventory for polychlorinated dibenz*o*-*p*-dioxins (PCDD) and polychlorinated dibenzofurans (PCDF) as requested in subparagraph (a) of the Article 5 in the Stockholm Convention on Persistent Organic Pollutants. It is aimed to cover all release vectors (air, water, land, products, residues) from industrial and domestic activities by identifying the sources and quantifying the releases for two

classes of unintentionally generated POPs. Other chemicals' related conventions typically cover more chemicals but are limited in scope, address one release vector only, target special industrial sectors or only address potential problems within one country. The main dioxin and furan sources for Turkey defined by UNEP Toolkit (UNEP Dioxin Toolkit 2005) updated in 2005, are considered to be basic for this inventory and prepared inventory using by UNEP Toolkit is given below in Table 36.

Category 1. Waste Incineration

The main hazardous and medical waste incinerator (İzaydaş) licensed by Turkish Ministry of Environment and Forestry is located in İzmit. The incineration capacity of this plant is 35,000 ton/year and the plant operated by around half capacity. The quantity of disposed waste in the facility since the starting date is given in Table 37. Emissions of dioxins and furans are also monitored in this facility and sludge's and ashes are land filled.

Table 36. UNEP PCDD/F Source Categories

Cat	Source Categories	Air	Water	Land	Products	Residue
1	Waste Incineration	X				X
2	Ferrous and Non-Ferrous Metal Production	X				X
3	Power Generation and Heating	X				X
4	Production of Mineral Products	X				X
5	Transportation	X				
6	Uncontrolled Combustion Processes	X	X	X		X
7	Production of Chemicals and Consumer Goods	X	X		X	X
8	Miscellaneous	X	X	X	X	X
9	Disposal/Landfilling	X	X	X		X
10	Identification of potential hot spots	Probably registration only to be followed by site-specific evaluation				

X indicates a main release route for each category on a relative basis although some of these releases may not be well characterized.

Table 37. Total disposed waste in İzaydaş Incinerator

Waste Type	1997-98-99 (kg)	2000 (kg)	2001 (kg)	2002 (kg)	2003 (kg)	Sub-Total (kg)
Bunker	10,289,380	10,435,519	10,797,753	6,989,034	13,415,548	54,680,539
Tubes	1.087.780	722.129	1.508.685	485.058	552.944	4.564.419
Flammable Liquid	2.434.643	2.542.414	1.141.597	1.923.147	1.815.919	10.634.665
Liquid with water	412.745	142.091	253.940	283.969	181.939	1.476.680
Special liquid	21.356	59.073	211.109	135.833	192.015	680.295
Medical	62.459	2.401	89.499	207.566	290.722	717.533
TOTAL	14.308.363	13.903.627	14.002.583	10.024.607	16.449.087	72.754.131

Source: Izaydaş A.Ş. web page www.izaydas.com

The other incinerators in Turkey which consist of medical waste incinerators are as follows:

Another medical waste incinator constructed by the Istanbul Municipality and working in Odayeri/Gediktürk. Its capacity 24 tons/day. Any other construction of the medical waste incinerators were forbitten in the hospitals. According to the Regulation of the Official Gazette dated July 22, 2005 and no: 25883. The construction of the incinerators in a region or in a central location was promoted in the some regulation in addition, the some regulation forbit the heavy metals in the medical waste and indicate also emission values would be controlled.

In the regulation of the Offical Gazette dated 22 June 2005 and no: 25883, the waste need as additional fuel described. In the same regulation, waste oils I and II categories, automobile tires, etc… can be used as additional fuel in the cement kilns after receive licence from the Ministry of Environment and Forestry. Under this regulation fifteen cement kilns allowed to burn hazardous wastes. On of this in the waste of cheese factory.

PCDD/F inventory information is given in Table 38 according to information indicated:

Category 2. Ferrous and non-ferrous metal production

Production of ferrous and non-ferrous metals is now the largest source of PCDD/PCDF in many European countries and also for Turkey. This source was not recognized until relatively recently, and many countries still ignore it. There are many different processes in this category and many different release points; both determining the classification and quantification of releases are difficult. Especially for this sector, detailed database should be prepared for POPs inventory as soon as possible.

Turkey has three integrated steel plants, which are equipped with well process control technology. Production processes at these plants utilize coke-sinter-blast furnace-BOF-continuous casting-hot rolling-continuous cold rolling technology. However the air pollution control of these plants are not BAT.

In Turkey, there are more than 20 Electric Arc Furnaces which produces steel from scrap, over 100 independent steel foundries, and many steel plant (over 900) which produce steel from cast iron and scrap. On the other hand, many of them have no proper process control, also most of which use waste iron in the production process. The total number of this small and medium enterprises are around 1100. There are lack of sufficient and reliable process information about these enterprises especially for foundries for to calculate POPs emission
factors.

Coke in Turkey has mostly produced by government owned plants in generally north regions. The production process mostly uses old technology and coke plants don't have gas or particulate matter control systems.

Copper production is very common in Turkey. According to the SPO 9th Development Plan Specialized Expert Committe Report in 2005, 35,000 tons of primary and 627,700 tons of secondary copper was produced in Turkey. A significant portion of blister copper production in Turkey is realized through the flash melting method, which is a new technology.

Copper production using scrap copper is accomplished by different plants located in İstanbul, İzmir, Ankara, Balıkesir, Eskişehir and Mersin. The annual production is estimated to be around 50,000

tons. Due to lack of information, all the plants in this sector are considered to have only the basic technology for emission factors.

Aluminum is mainly produced as a primary aluminum plant in Konya, Aluminum production from waste aluminum scraps is mainly accomplished by bigger plants located in İstanbul, İzmir, Ankara and Mersin. Some of these firms have good process control technologies and some of them have only simple dust removal systems. Approximately 40,000 tons of aluminum scrap is provided from external resources. Imports are mainly made from Russia, CIS and North European countries.

In the cast aluminum sector, especially as a result of development of the domestic motor vehicles industry and increases in the cast aluminum exports, a significant progress is anticipated. As of 2005, a total of 250 enterprises (ranging from small to large scale) have realized a total annual production of 35,000 tons.

Lead and zinc are mainly produced by small and medium enterprises in Turkey. The total lead production in Turkey is about 500,000 tons and 69.000 tons for zinc in 2002 and there is only one plant in Ankara which produces lead from waste lead. There are 15 zinc recovery plants in Turkey which produce zinc from waste materials.

Magnesium production is very limited in Turkey, there are 3 registered magnesium producers in Turkey that are located in İstanbul, Tekirdağ and Balıkesir but no production information are available.

There is yet no nickel production in Turkey except for the pilot establishment set up for nickel production.

PCCD/F inventory data obtained from above information are given on Table 38.

Table 38. PCDD/F Inventory for Waste Incineration in Turkey, year 2006

Cat.	Subcat	Class	Sub-categories	Potential Release Route (µg TEQ/t)						Production t/a	Annual release					
				Air	Water	Land	Product	Residue			g TEQ/a Air	g TEQ/a Water	g TEQ/a Land	g TEQ/a Product	g TEQ/a Fly ash	g TEQ/a Bottom Ash
								Fly Ash	Bottom Ash							
			Waste incineration													
1			**Municipal solid waste incineration**							**0**	**0,000**	**0**	**0**	**0**	**0,000**	**0,000**
	a	1	Low technol. combustion, no APCS	3.500		NA	NA	0	75		**0,000**				**0,000**	**0,000**
		2	Controlled comb., minimal APCS	350		NA	NA	500	15		**0,000**				**0,000**	**0,000**
		3	Controlled comb., good APCS	30		NA	NA	200	7		**0,000**				**0,000**	**0,000**
		4	High tech. combustion, sophisticated APCS	0,5		NA	NA	15	1,5		**0,000**				**0,000**	**0,000**
			Hazardous waste incineration							**30.000**	**0,023**	**0**	**0**	**0**	**0,900**	**0,000**
	b	1	Low technol. combustion, no APCS	35.000		NA	NA	9.000			**0,000**				**0,000**	**0,000**
		2	Controlled comb., minimal APCS	350		NA	NA	900			**0,000**				**0,000**	**0,000**
		3	Controlled comb., good APCS	10		NA	NA	450			**0,000**				**0,000**	**0,000**
		4	High tech. combustion, sophisticated APCS	0,75		NA	NA	30		30.000	**0,0225**				**0,900**	**0,000**
			Medical waste incineration							**8.600**	**62,800**	**0**	**0**	**0**	**0,000**	**0,352**
	c	1	Uncontrolled batch combustion, no APCS	40.000		NA	NA		200	1.000	**40,000**				**0,000**	**0,200**
		2	Controlled, batch, no or minimal APCS	3.000		NA	NA		20	7.600	**22,800**				**0,000**	**0,152**
		3	Controlled, batch comb., good APCS	525		NA	NA	920	ND		**0,000**				**0,000**	
		4	High tech, continuous, sophisticated APCS	1		NA	NA	150			**0,000**				**0,000**	**0,000**
			Light fraction shredder waste incineration							**0**	**0,000**	**0**	**0**	**0**	**0,000**	**0,000**
	d	1	Uncontrolled batch comb., no APCS	1.000		NA	NA	ND	ND		**0,000**					

		2	Controlled, batch, no or minimal APCS	50		NA	NA	ND	ND		**0,000**					
		3	High tech, continuous, sophisticated APCS	1		NA	NA	150			**0,000**				**0,000**	**0,000**
			Sewage sludge incineration							**0**	**0,000**	**0**	**0**	**0**	**0,000**	**0,000**
	e	1	Old furnaces, batch, no/little APCS	50		NA	NA	23			**0,000**				**0,000**	**0,000**
		2	Updated, continuously, some APCS	4		NA	NA	0,5			**0,000**				**0,000**	**0,000**
		3	State-of-the-art, full APCS	0,4		NA	NA	0,5			**0,000**				**0,000**	**0,000**
			Waste wood and waste biomass incineration							**10.000**	**0,010**	**0**	**0**	**0**	**0,002**	**0,000**
	f	1	Old furnaces, batch, no/little APCS	100		NA	NA	1.000			**0,000**				**0,000**	**0,000**
		2	Updated, continuously, some APCS	10		NA	NA	10			**0,000**				**0,000**	**0,000**
		3	State-of-the-art, full APCS	1		NA	NA	0,2		10.000	**0,010**				**0,002**	**0,000**
			Animal carcasses burning							**0**	**0,000**	**0**	**0**	**0**	**0,000**	**0,000**
	g	1	Old furnaces, batch, no/little APCS	500		NA	NA		ND		**0,000**				**0,000**	
		2	Updated, continuously, some APCS	50		NA	NA		ND		**0,000**				**0,000**	
		3	State-of-the-art, full APCS	5		NA	NA		ND		**0,000**				**0,000**	
			Waste Incineration								**62,833**	**0**	**0**	**0**	**0,902**	**0,352**
															1,3	

Source: The Ministry of Environment and Forestry 2006

Table 39. PCDD/F Inventory for Ferrous and Non-Ferrous Metal Production in Turkey, year 2006

Cat, .	Subcat .	Class	Sub-categories	Potential Release Route (µg TEQ/t)					Production t/a	Annual release				
				Air	Water	Land	Product	Residue		g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
2			**Ferrous and Non-Ferrous Metal Production**							**Air**	**Water**	**Land**	**Product**	**Residue**
	a		**Iron ore sintering**							**73,031**	**0**	**0**	**0**	**0,0**
		1	High waste recycling, incl. oil contamin. Materials	20	ND	ND	ND	0,003	3.151.531	**63,031**				**0,009**
		2	Low waste use, well controlled plant	5	ND	ND	ND	0,003	2.000.000	**10,000**				**0,006**
		3	High technology, emission reduction	0,3	ND	ND	ND	0,003		**0,000**				**0,000**
	b		**Coke production**						**4.421.196**	**13,264**	**7,95815E-07**	**0**	**0**	**0**
		1	No gas cleaning	3	0,06	ND	ND	ND	4.421.196	**13,264**	**7,95815E-07**			
		2	Afterburner/ dust removal	0,3	0,06	ND	ND	ND		**0,000**	**0**			
	c		**Iron and steel production plants and foundries**						**27.083.500**	**174**	**0**	**0**	**0**	**268**
			Iron and steel plants						*26.057.500*	*174*	*0*	*0*	*0*	*267,413*
		1	Dirty scrap, scrap preheating, limited controls	10	ND	ND	NA	15	17.357.500	**173,575**				**260,363**
		2	Clean scrap/virgin iron, afterburner, fabric filter	3	ND	ND	NA	15	0	**0,000**				**0,000**
		3	Clean scrap/virgin iron, BOS furnaces	0,1	ND	ND	NA	1,5	4.700.000	**0,470**				**7,050**
		4	Blast furnaces with APC	0,01	ND	ND	NA	ND	4.000.000	**0,175**				
			Foundries						***1.026.000***	***0,031***	***0***	***0***	***0***	***0,5***
		1	Cold air cupola or rotary drum, no APCS	10	ND	ND	NA	ND		**0,000**				
		2	Rotary drum - fabric filter	4,3	ND	ND	NA	0,2		**0,000**				**0,000**
		3	Cold air cupola, fabric filter	1	ND	ND	NA	8		**0,000**				**0,000**
		4	Hot air cupola or induction furnace, fabric filter	0,03	ND	ND	NA	0,5	1.026.000	**0,031**				**0,513**
			Hot-dip galvanizing plants						**0**	**0,000**	**0**	**0**	**0**	**0,0**
		1	Facilities without APCS	0,06	NA	NA	NA	ND		**0,000**				
		2	Facilties without degreasing step, good APCS	0,05	NA	NA	NA	2.000		**0,000**				**0,000**
		3	Facilities with degreasing step, good APCS	0,02	NA	NA	NA	1.000		**0,000**				**0,000**
	d		**Copper production**						**712.700**	**352,162**	**0**	**0**	**0**	**395,5**

		1	Sec. Cu - Basic technology	800	ND	NA	NA	630	427.700	**342,160**			**269,451**
		2	Sec. Cu - Well controlled	50	ND	NA	NA	630	200.000	**10,000**			**126,000**
		3	Sec. Cu - Optimized for PCDD/PCDF control	5	ND	NA	NA	300		**0,000**			**0,000**
		4	Smelting and casting of Cu/Cu alloys	0,03	ND	NA	NA	ND	50.000	**0,002**			
		5	Prim. Cu, well-controlled, with some secondary feed materials	0,01	ND	NA	NA	ND		**0,000**			
		6	Pure prim. Cu smelters with no secondary feed	ND	ND	NA	NA	NA	35.000				
	e		**Aluminum production**						**145.000**	**6,525**	**0**	**0**	**0**	**12,0**
		1	Processing scrap Al, minimal treatment of inputs, simple dust removal	150	ND	NA	NA	200	40.000	**6,000**			**8,000**
		2	Scrap treatment, well controlled, good APCS	35	ND	NA	NA	400	10.000	**0,350**			**4,000**
		3	Scrap treatment, well-controlled, fabric filter, lime injection	5	ND	NA	NA	100		**0,000**			**0,000**
		4	Optimized proces for PCDD/PPCDF abatement	0,5	ND	NA	NA	100		**0,000**			**0,000**
		5	Shavings/turnings drying (simple plants)	5,0	NA	NA	NA	NA	35.000	**0,175**			
		6	Thermal de-oiling, rotary furnaces, afterburners, fabric filters	0,3	NA	NA	NA	NA		**0,000**			
		7	Pure primary Al plants	ND	NA	NA	NA	ND	60.000				
	f		**Lead production**						**3.000**	**0,240**	**0**	**0**	**0**	**0,0**
		1	Sec. lead from scrap, PVC battery separators	80	ND	NA	NA	ND	3.000	**0,240**				
		2	Sec. from PVC/Cl2 free scrap, some APCS	8	ND	NA	NA	5		**0,000**			**0,000**
		3	Sec. Lead, PVC/Cl2 free scrap in modern furnaces, with scrubber	0,5	ND	NA	NA	ND		**0,000**			
		4	Pure primary lead production	0,5	ND	NA	NA	ND		**0,000**			
	g		**Zinc production**						**5.080**	**5,080**	**0**	**0**	**0**	**0**
		1	Kiln with no dust control	1.000	ND	NA	NA	ND	**5.080**	**5,080**				
		2	Hot briquetting/rotarry furnaces, basic control	100	ND	NA	NA	ND		**0,000**				
		3	Comprehensive control	5	ND	NA	NA	ND		**0,000**				
		4	Melting (only)	0,3	ND	NA	NA	ND		**0,000**				
		5	Pure primary zinc production	ND	ND	NA	NA	ND						

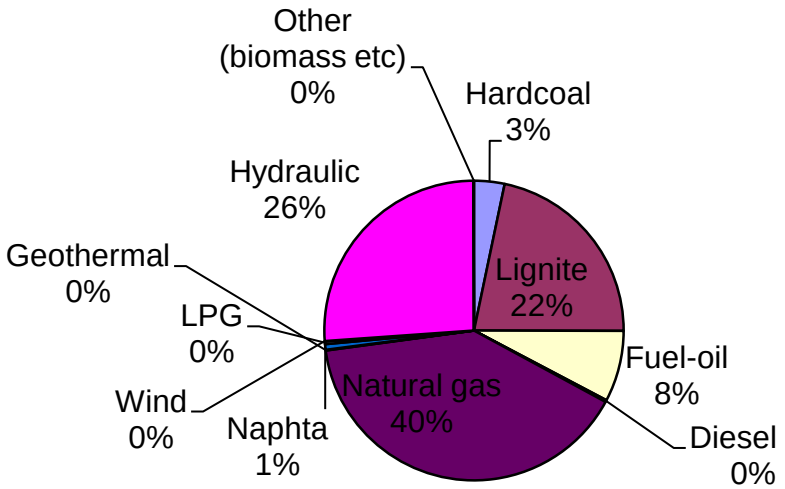
	h		**Brass and bronze production**					**724.878**	**0,246**	**0**	**0**	**0**	**0,0**
		1	Thermal de-oiling of turnings	2,5	NA	NA	NA	NA	**0,000**				
		2	Simple melting furnaces	10	NA	NA	NA	ND	**0,000**				
		3	Mixed scarp, induction furnace, bagfilter	3,5	ND	NA	NA	125	51.000	**0,179**				**0,000**
		4	Sophisticated equipment, clean inputs, good APCS	0,1	ND	NA	NA	ND	673.878	**0,067**				
	i		**Magnesium production**						**0**	**0,000**	**0,0**	**0,0**	**0,0**	**0,0**
		1	Using MgO/C thermal treatment in Cl2, no effluent treatment, poor APCS	250	9.000	NA	ND	0		**0,000**	**0,000**			
		2	Using MgO/C thermal treatment in Cl2, comprehensive pollution control	50	24	NA	ND	9.000		**0,000**	**0,000**			**0,000**
		3	Thermal reduction process	3	ND	NA	NA	ND		**0,000**				
	j		**Thermal Non-ferrous metal production (e.g., Ni)**						**0**	**0,000**	**0**	**0**	**0**	**0**
		1	Contaminated scrap, simple or no APCS	100	ND	ND	ND	ND		**0,000**				
		2	Clean scrap, good APCS	2	ND	ND	ND	ND		**0,000**				
	l		**Shredders**						**0**	**0,000**	**0**	**0**	**0**	**0**
		1	Metal shredding plants	0,2	NA	NA	ND	ND		**0,000**				
	m		**Thermal wire reclamation**						**0**	**0,000**	**0**	**0**	**0**	**0**
		1	Open burning of cable	5.000	ND	ND	ND	ND		**0,000**				
		2	Basic furnace with after burner, wet scrubber	40	ND	NA	ND	ND		**0,000**				
		3	Burning electric motors, brake shoes, etc., afterburner	3,3	ND	NA	ND	ND		**0,000**				
2			**Ferrous and Non-Ferrous Metal Production**							**624,662**	**0,000**	**0,000**	**0,000**	**675,392**

Source: Turkish Union of Chambers and Commodity Exchanges, 2007 and SIS,2006.

Category 3. Power generation and heating/cooking

In Turkey energy is produced mainly from natural gas, hydraulic and fossil fuels such as lignite, coal and fuel-oil. The distribution of Turkish energy production amon the other energy sources for 2002 is given in Figure 1.

Figure 1. Gross production of electric power by power sources (Source: EUAS)



Source	Value 10³ kWh
Hardcoal	4255
Lignite	28134
Fuel-oil	9504
Diesel oil	268
Natural gas	51676
Geothermal	104
Naphta	761
LPG	583
Wind	47
Hydraulic	33717
Other (biomass etc.)	74

As for the year 2002, 47% of total energy is produced by EUAS, Governmental Electricity Generation Corporation; of which are composed of 15% of auto producers; 3,5% of concessionary companies; 15% of production companies; 3,5% of mobile power plants and 16% produced by affiliated partnerships of EUAS. One of the important progress about Turkish Energy sector is the increase of clean energy sources such as wind, solar and geothermal. For example, wind energy use in 1990 was 0.3% and this value has increased two fold to 0.6% in the year 2001. Solar energy use was 0.1% in 1990 and this value has also risen to 1.1% in the year 2001.

An other important improvement related with POPs formation, was that some of municipalities has started to use landfill gas for energy production. The first project was realized for the first time in Turkey in Kemerburgaz Garbage Dump that was used as a wild emptying area before 1995. After rehabilitation of unused landfill area (Photo 1 and Photo 2), the Company produced 15.000.000 kWh electricity per year. PCDD/F inventory for this sector is given in Table 40.



Photo 1,2. Landfill gas production facility, İstanbul

Table 40. PCDD/F Inventory for Power Generation and Heating/Cooking in Turkey, year 2006

Cat.	Subcat.	Class	Sub-categories	Potential Release Route (µg TEQ/TJ)					Production	Annual release					Ash Generation
				Air	Water	Land	Product	Residue	TJ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	t/a
										Air	Water	Land	Product	Residue	
3			**Heat and Power Generation**												
	a		**Fossil fuel power plants**						**498.066**	**3,548**	**0**	**0**	**0**	**4,7**	
		1	Fossil fuel/waste co-fired power boilers	35	ND	NA	NA	ND		**0,000**					
		2	Coal fired power boilers	10	ND	NA	NA	14	339.066	**3,391**				**4,747**	
		3	Heavy fuel fired power boilers	2,5	ND	NA	NA	ND	39.000	**0,098**					
		4	Shale oil fired power plants	1,5	ND	NA	NA	ND		**0,000**					
		5	Light fuel oil/natural gas fired power boilers	0,5	ND	NA	NA	ND	120.000	**0,060**					
	b		**Biomass power plants**						**12.000**	**6,000**	**0**	**0**	**0**	**0,0**	
		1	1. Mixed biomass fired power boilers	500	ND	NA	NA	ND	12.000	**6,000**					
		2	2. Clean wood fired power boilers	50	ND	NA	NA	15		**0,000**				**0,000**	
	c		**Landfill and biogas combustion**						**18.000**	**0,144**	**0**	**0**	**0**	**0,0**	
		1	Biogas-/landfill gas fired boilers, motors/turbines and flaring	8	ND	NA	NA	NA	18.000	**0,144**					
	d		**Household heating and cooking - Biomass**					µg TEQ/t Ash	**500.000**	**50,000**	**0**	**0**	**0**	**0,0**	Please enter mass of ash here
		1	Contaminated wood/biomass fired stoves	1.500	ND	NA	NA	1.000		**0,000**				**0,000**	
		2	Virgin wood/biomass fired stoves	100	ND	NA	NA	10	500.000	**50,000**				**0,000**	
	e		**Domesting heating - Fossil fuels**					µg TEQ/t Ash	**11.287.723**	**83,603**	**0**	**0**	**0**	**0,0**	Please enter mass of ash here
		1	High-chlorine coal fired stoves	12.000	ND	NA	NA	30.000		**0,000**				**0,000**	
		2	Coal fired stoves	100	ND	NA	NA	5.000	676.000	**67,600**				**0,000**	
		3	Oil fired stoves	10	ND	NA	NA	NA	10.000	**0,100**					
		4	Natural gas fired stoves	1,5	ND	NA	NA	NA	10.601.723	**15,903**					
3			**Heat and Power Generation**							**143,295**	**0**	**0**	**0**	**4,7**	

Source: TUSO Turkish Statistical Annual 2006, State Planning Office 2007.

Category 4. Production of Mineral Products

Turkey has a well developed cement industry, the total number of registered cement factories are 48 and 45 of these factories are members of the Turkish Cement Producers Association (TCMA). TCMA controls, regulates and inspects the members' facilities in the aspect of process, quality and environment.

Most of the cement facilities in Turkey has equipped with modern process control technology, which limits the release of POPs for this sector. In accordance with the 2001 Communique which permits supplementary fuels such as scrap oil, scrap fabrics, scrap car tires to be incinerated at the cement furnaces, test incinerations have been carried out since 2004 at a few cement facilities. This communique shall be annulled in 2008 by the Ministry of Environment and Forestry, and the Regulations for the Incineration of Wastes shall be put into force.

Lime is produced by different techniques in different regions of Turkey, commonly by small and medium enterprises. There are only 2-3 big facilities in this sector, which control 50% of the market and generally have good dust removal mechanisms in the process. Most of the other half of the firms produce sufficient lime by general techniques have no process control.

Turkey is one of the biggest brick and ceramic producers in the world. A lot of types of bricks are produced such as hot brick, cold brick, block brick, silica brick, isolation brick, magnetite brick, tile etc. in Turkey. According to Turkish statistics, only tile production capacity is more than 100.000 ton per year and most of the facilities in this sector have no proper process control systems. Most of the ceramic is produced by big enterprises in Turkey and they have generally sufficient dust abatement systems.

Glass is produced mainly by big enterprises and they have good process control systems, especially for dust. Glass production from waste glass is also performed by four SMEs in Istanbul, Izmir, Konya and Adana. 100.000 tons of glass per year are recovered by this SMEs in Turkey, which means 10% of total glass production is recovered.

Total registered lime, brick, glass and ceramic producers in Turkey is 937.

Asphalt is produced mostly by municipalities in Turkey. The raw material for asphalt is only produced by TUPRAS, Turkish Petroleum Refineries Inc. Although most of the producers use natural gas or LPG in the process, there is none or insufficient process control systems in this sector (Photo 3). Total number of asphalt producers in Turkey is 41 as for the year 2003.

The total number of asphalt producers in Turkey is 41 as of 2006. ISFALT, which is s subsidiary of the Municipality of the Greater Istanbul, is producing asphalt at its 5 facilities (Aydınlı, Ümraniye, Mahmutbey, Habibler, İkitelli) located at both sides of Istanbul, and currently realizes 20% of total asphalt production in Turkey with its 5,000,000 tons annual production.

PCCD/F inventory data for mineral production process obtained from above information is given on Table 41.

Photo 3. Asphalt production in Turkey

Table 41. PCDD/F Inventory for Production of Mineral Products in Turkey, year 2006

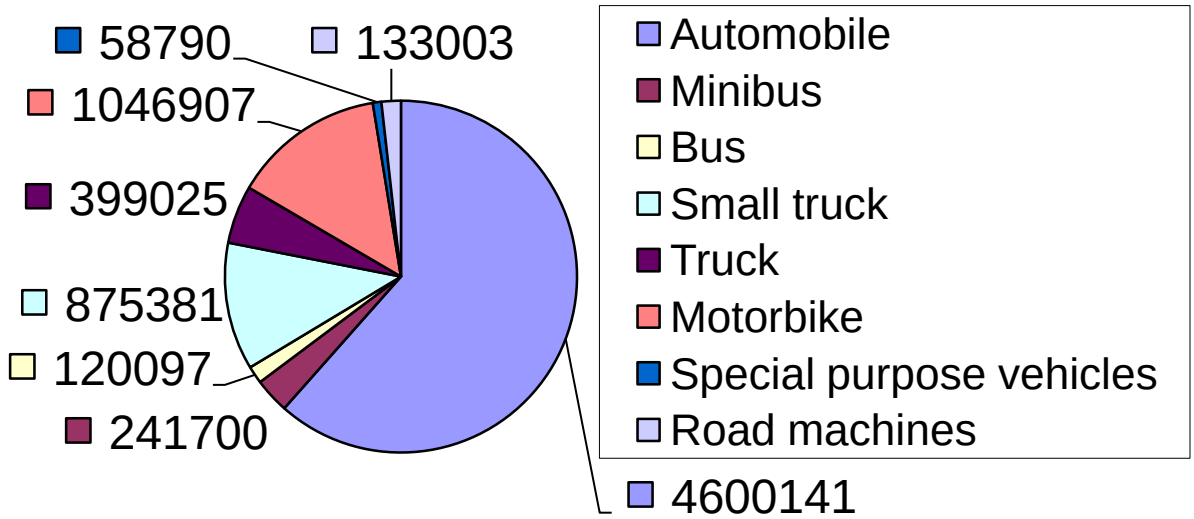
Cat.	Subcat.	Class	Sub-categories	Potential Release Route (µg TEQ/t)					Production	Annual release				
				Air	Water	Land	Product	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
4			**Production of Mineral Products**							**Air**	**Water**	**Land**	**Product**	**Residue**
	a		**Cement kilns**						**47.934.860**	**239,674**	**0**	**0**	**0**	**0**
		1	Shaft kilns	5	NA	NA	ND	ND		**0,000**				
		2	Old wet kilns, ESP temperature >300 °C	5	NA	ND	ND	NA	47.934.860	**239,674**				
		3	Wet kilns, ESP/FF temperature 200 to 300 °C	0,6	NA	ND	ND	NA		**0,000**				
		4	Wet kilns, ESP/FF temperature <200 °C and all types of dry kilns with preheater/precalciner, T<200 °C	0,05	NA	ND	ND	NA		**0,000**				
	b		**Lime**						**1.200.000**	**4,056**	**0**	**0**	**0**	**0**
		1	Cyclone/no dust control, contaminated or poor fuels	10	ND	ND	ND	ND	400.000	**4,000**				
		2	Good dust abatement	0,07	ND	ND	ND	ND	800.000	**0,056**				
	c		**Brick**						**165.000**	**0,027**	**0**	**0**	**0**	**0**
		1	Cyclone/no dust control, contaminated or poor fuels	0,2	NA	ND	ND	ND	132.500	**0,027**				
		2	Good dust abatement	0,02	NA	ND	ND	ND	32.500	**0,001**				
	d		**Glass**						**1.626.339**	**0,043**	**0**	**0**	**0**	**0**
		1	Cyclone/no dust control, contaminated or poor fuels	0,2	NA	ND	ND	ND	100.000	**0,020**				
		2	Good dust abatement	0,015	NA	ND	ND	ND	1.526.339	**0,023**				
	e		**Ceramics**						**654.000**	**0,023**	**0**	**0**	**0**	**0**
		1	Cyclone/no dust control, contaminated or poor fuels	0,2	NA	ND	ND	ND	54.000	**0,011**				
		2	Good dust abatement	0,02	NA	ND	ND	ND	600.000	**0,012**				
	f		**Asphalt mixing**						**25.000.000**	**1,750**	**0**	**0**	**0**	**0,000**
		1	Mixing plant with no gas cleaning	0,07	NA	ND	ND	ND	25.000.000	**1,750**				
		2	Mixing plant with fabric filter, wet scrubber	0,007	NA	ND	ND	0,06		**0,000**				**0,000**
	g		**Oil shale processing**						**0**	**0,000**	**0**	**0**	**0**	**0,000**
		1	Thermal fractionation	ND	ND	ND	ND	ND						
		2	Oil shale pyrolysis	0,003	NA	ND	0,07	2		**0,000**			**0,000**	**0,000**
4			**Production of Mineral Products**							**245,573**	**0**	**0**	**0**	**0,000**

Source: Turkish Chambers and Commerce Unions, 2006 and TUSA, 2006.

Category 5. Transportation

Information on motor vehicles entered in or deleted from registers circulated by the General Directorate of Public Security since 1987, the data collected and published by State Institute of Statistics (SIS) are given in Figure 2.

Figure 2. Road motor vehicles by type



On the other hand, all types of fuels are produced by governmental petroleum corporation, so these data supported by TUPRAS (Turkish Petroleum Refineries Inc.) are used for calculation of emission parameters for transportation. TUPRAS has stopped the production normal gasoline with low octane in 2002, now produces only gasoline and unleaded gasoline for vehicles. The fuels are produced in 4 refineries located in Izmit, Izmir, Kırıkkale and Batman.

PCCD/F inventory data for transportation obtained from above information is given in Table 42.

Category 6. Uncontrolled combustion process

Forestry areas cover 26% of the total surface area of Turkey. According to Turkish Forestation General Directorate, total forestation area is considered to be 2.4 million hectares. Every year 5.000 to 10.000 hectares are damaged by fire.

In 2002, 4.562 hectares are damaged by fire. In 2006, a total of 4.793 hectares of forest area has burned in 1.657 fires. On the hand, burning of agricultural residues are still common in some regions although with a decreasing rate, some authors consider the total area is around 14,000,000 hectares (İhsan Bulut, Atatürk Üniversitesi Fen-Edebiyat Fak Coğrafya Bölümü).

Landfill fires are one of the ecological problems of Turkey. However, most of the solid wastes dumped by some metropolitan municipalities like İstanbul, İzmir and Bursa which causes anaerobic conditions therefore landfill fires are frequent in this areas. Because of lack of information, research projects should be started for this matter.

The other important issue for this topic is accidental fires in the industrial facilities. In the past 10 years, vast industrial fires occurred in Turkey;

- 1997 Kırıkkale Machine and Chemical Industry Association Explosion
- 1997 Istanbul Tuzla Shipyard Fire
- 1999 İzmit, Turkish Petroleum Refineries Inc. Fire (Took place after the earthquake)
- 1999 Yalova Aksa Acrylic Chemical Industry Inc. Fire (Took place after the earthquake)
- 2000 İzmit Dilovası Industrial District
- 2006 Tuzla Shipyard Fire

When the fires taking place at the small to medium scale enterprises are also taken into account, no clear data exists regarding POPs emissions to the environment through these sources. It is important to take precautions and mitigate the effects of uncontrollable and sudden release of POPs after a major industrial accident, to the environment and human health. In Turkey, "The By-Law on the Control of Major Industrial Accidents" which is aligned with 96/82/Ec Seveso II Directive was published in the Official Gazette No. 27676 dated 18 August 2010. The objective of the regulation is to prevent major accidents which involve dangerous substances including dioxin furans, and to minimize the consequences for man and the environment

According to 2006 data obtained from the Municipality of the Greater Istanbul Fire Department, emission data calculated for 22.064 fire incidents took place in Istanbul only, is shown in Table 43.

PCCD/F inventory data for the uncontrolled combustion processes obtained using the information given above, are given in Table 43.

Table 42. PCDD/F Inventory for Transportation in Turkey, year 2006

Cat.	Subcat.	Class	Sub-categories	Potential Release Route (µg TEQ/t) Air	Water	Land	Product	Residue	**Consumption t/a ***	**Annual release g TEQ/a Air**	**g TEQ/a Water**	**g TEQ/a Land**	**g TEQ/a Product**	**g TEQ/a Residue**
5			**Transport**							**21,532**	**0**	**0**	**0**	**0**
	a		**4-Stroke engines**						**3.625.000**	**0,363**	**0**	**0**	**0**	**0**
		1	Leaded fuel	2,2	NA	NA	NA	NA	0	**0,000**				
		2	Unleaded fuel without catalyst	0,1	NA	NA	NA	NA	3.625.000	**0,363**				
		3	Unleaded fuel with catalyst	0,00	NA	NA	NA	NA		**0,000**				
	b		**2-Stroke engines**						**0**	**0,000**		**0**	**0**	**0**
		1	Leaded fuel	3,5	NA	NA	NA	NA		**0,000**				
		2	Unleaded fuel without catalyst	2,5	NA	NA	NA	NA		**0,000**				
	c		**Diesel engines**						**7.616.000**	**0,762**	**0**	**0**	**0**	**0**
		1	Diesel engines	0,1	NA	NA	NA	ND	7.616.000	**0,762**				
	d		**Heavy oil fired engines**						**5.102.000**	**20,408**	**0**	**0**	**0**	**0**
		1	All types	4	NA	NA	NA	ND	5.102.000	**20,408**				

Source: TUSA Turkish Istatistics Annual, TUOPC Turkish Oil Production Cooperation 2007 and SPO, 2006.

* Assuming that consumption equals sales

Conversion factors:volume --> mass	L	kg
Gasoline	1	0,74
Diesel	1	0,85

Table 43. PCDD/F Inventory for Uncontrolled Combustion Process in Turkey, year 2006

Cat.	Subcat.	Class	Sub-categories	Potential Release Route (µg TEQ/t)					Production	Annual release				
				Air	Water	Land	Product	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
										Air	Water	Land	Product	Residue
6			**Open Burning Processes**											
	a		**Fires/burnings - biomass**						**3.000.000**	**35,500**	**0**	**24,000**	**0**	**0**
		1	Forest fires	5	ND	4	NA	ND	1.000.000	**5,000**		**4,000**		
		2	Grassland and moor fires	5	ND	4	NA	ND		**0,000**		**0,000**		
		3	Agricultural residue burning (in field), impacted, poor combustion conditions	30	ND	10	NA	ND	1.000.000	**30,000**		**10,000**		
		4	Agricultural residue burning (in field), not impacted	0,5	ND	10	NA	ND	1.000.000	**0,500**		**10,000**		
	b		**Fires, waste burning, landfill fires, industrial fires, accidental fires**						**130.064**	**115,491**	**0**	**71,959**	**0**	**0**
		1	Landfill fires	1.000	ND	600	NA	600	108.000	**108,000**		**64,800**		
		2	Accidental fires in houses, factories	400	ND	400	NA	400	17.702	**7,081**		**7,081**		
		3	Uncontrolled domestic waste burning	300	ND	600	NA	600		**0,000**		**0,000**		
		4	Accidental fires in vehicles (per vehicle)	94	ND	18	NA	18	4.362	**0,410**		**0,079**		
		5	Open burning of wood (construction/demolition)	60	ND	10	NA	10		**0,000**		**0,000**		
6			**Open Burning Processes**							**150,991**	**0**	**95,959**	**0**	**0,000**

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

Source: Turkish Five Years Development Plan 2006, Ministry of Environment and Forestry, 2007 and SPO, 2006.

Category 7. Production of Chemicals, Consumer Goods

Pulp and paper in Turkey are mainly produced by private sector, following the privatization in paper sector. Public facilities are privatized and production statistics have started to change. According to 2006 data, about 33% of the total paper production is realized by the public sector, with the share of the private sector increasing continuously as a result of the privatizations. Approximately 20% of the produced paper comes from recycled waste paper (Photo 4).

Photo 4. Paper production from waste paper

Pesticides are produced by 22 facilities which are, located in Istanbul, Izmir, Lüleburgaz and Izmit. According to emission factors prepared by UNEP, only 2,4-D are produced, by 4 facilities is around 7375 ton per year. 2,4,5-T are banned in 1979 and chlorbenzene is not produced in Turkey.

PVC is mainly produced by the public company, PETKIM. Increasing demand to PVC construction materials caused a lareg number of SMEs start producing PVC in the recent years. These developments have in turn caused a rapid change in the statistical data. PVC production in 2006 has been realized at 135,000 tons with the privatization of the public facility.

As for the textiles, Turkey is one the biggest textile producers in the World. Most of the textile producers are situated in Marmara region (Istanbul, Bursa, Tekirdağ), but in the recent years an significant progress is observed at the other regions, such as Agean region (Denizli, Aydın). The total producer numbers in the textile sector are more than 10,000 in 2002.

Leather industry is one of the "stimulating" sectors of the Turkish economy in terms of export potential. With an annual capacity of 400,000 tons, and 1,200 companies operating in the industry; the leather sector ranked as the 10th biggest industry branch. Nevertheless, the sector's capacity utilization ratio is exhibiting a gradual decrease trend due to its dependence on one single market, and unstable market movements. As of 2006, the capacity utilization ratio of the sector is around 70%.

PCCD/F inventory data for production of chemicals, consumer goods obtained from above information are given in Table 44.

Table 44. PCDD/F Inventory for Production of Chemicals, Consumer Goods in Turkey, year 2006

Cat.	Subcat.	Class	Sub-categories	Potential Release Route (µg TEQ/t)					Production	Annual release				
				Air	Water	Land	Product	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
7			**Production and Use of Chemicals and Consumer Goods**							**Air**	**Water**	**Land**	**Product**	**Residue**
	a		**Pulp and paper mills ***							**0,0**	**0,3**	**0,0**	**1,3**	**0,3**
			Boilers (per ton of pulp)						**0**	**0,000**	**0**	**0**	**0**	**0,000**
		1	Black liquor boilers, burning of sludges, wood	0,07				NA		**0,000**				
		2	Bark boilers only	0,2				50		**0,000**				**0,000**
			Acqueous discharges and products						800.190		**0,255**		**1,270**	**0,332**
		1	Kraft process, Cl2 gas, non-wood fibers, impacted		ND		30	ND					**0,000**	
		2	Kraft process, old technology (Cl2)		4,5		8	4,5	49.265		**0,222**		**0,394**	**0,222**
		3	Kraft process, mixed technology		1,0		3	1,5			**0,000**		**0,000**	**0,000**
		4	Sulfite pulp/papers, old technology		ND		1	ND					**0,000**	
		5	Kraft process, modern technology (ClO2)		0,06		0,5	0,2	550.925		**0,033**		**0,275**	**0,110**
		6	Sulfite papers, new technology (ClO2, TCF)		ND		0,1	ND					**0,000**	
		7	TMP pulp		ND		1,0	ND					**0,000**	
		8	Recycling papers from contaminated waste papers		ND		10						**0,000**	
		9	Recycling pulp/paper from modern papers		ND		3	ND	200.000				**0,600**	
	b		**Chemical industry**							**0,0**	**0,0**	**0,0**	**5,2**	**0,0**
			PCP						0	**0**	**0**	**0**	**0,000**	**0**
		1	European, American production (chlorination of phenol with Cl2)				2.000.000						**0,000**	
		2	Chinese production (thermolysis of HCH)				800.000						**0,000**	
		3	PCP-Na				500						**0,000**	
			PCB						0	**0**	**0**	**0**	**0,0**	**0**
		1	Low chlorinated, e.g., Clophen A30, Aroclor 1242				15.000							
		2	Medium chlorinated, e.g., Clophen A40, Aroclor 1248				70.000						**0,000**	
		3	Medium chlorinated, e.g., Clophen A50, Aroclor 1254				300.000						**0,000**	
		4	High chlorinated, e.g., Clophen A60, Aroclor 1260				1.500.000						**0,000**	
			Chlorinated Pesticides						7.375	**0**	**0**	**0**	**5,163**	**0**
		1	Pure 2,4,5-Trichlorophenoxy acetic acid (2,4,5-T)				7.000						**0,000**	
		2	2,4,6-Trichlorophenol (2,4,6-PCPh)				700						**0,000**	

		3	Dichlorprop				1.000							**0,000**	
		4	2,4-Dichlorophenoxy acetic acid (2,4-D)				700		7.375					**5,163**	
		5	2,4,6-Trichlorophenyl-4'-nitrophenyl ether (CNP = chloronitrofen)						*0*	*0*	*0*	*0*	*0,000*	*0*
			Old technology				300.000							**0,000**	
			New technology				400							**0,000**	
			Chloranil						0	**0**	**0,0**	**0,0**	**0,000**	**0**
		1	*p*-chloranil *via* chlorination of phenol				400.000							**0,000**	
		2	*p*-chloranil *via* hydrochinone				100							**0,000**	
		3	Dyestuffs on chloranil basis (old process, Class 1)				1.200							**0,000**	
		4	*o*-chloranil *via* chlorination of phenol				60.000							**0,000**	
			Chlorobenzenes						0	**0**	**0**	**0**	**0**	**0**
		1	*p*-Dichlorobenzene	ND	NA	NA	39	ND					**0,000**		
		2	*o*-Dichlorobenzene	ND	NA	NA	0	ND					**0,000**		
		3	1,2,4-Trichlorobenzene	ND	NA	MA	0	3.000					**0,000**	**0**	
			Chlorine/chloralkali production						0	**0**	**0**	**0**	**0**	**0**
			Chloralkali production using graphite anodes	NA	NA	NA	NA	1.000						**0**	
			ECD/VCM/PVC						135.097	**0,0**	**0,0**		**0,014**	**0**
		1	Old technology, EDC/VCM, PVC		1	NA		ND			**0**				
		2	Modern plants, EDC/VCM or EDC/VCM/PVC	0,4	0,5	NA	0,03	10		**0**	**0,000**		**0,000**	**0**	
		3	PVC only	0,0003	0,03	NA	0,1	0,2	135.097	**4,1E-05**	**0,00405**		**0,014**	**0,0**	
	c		**Petroleum refineries**						**0**	**0,0**	**0**	**0**	**0**	**0**
		1	All types (flares) (µg TEQ/TJ) **	8	NA	NA	NA	ND	0	**0**					
	d		**Textile plants**						**800.000**	**0**	**0**	**0**	**10,07**	**0**
		1	Upper limit	NA	ND	NA	100	ND	100.000				**10**		
		2	Lower limit	NA	ND	NA	0,1	ND	700.000				**0,07**		
	e		**Leather plants**						**400.000**	**0**	**0**	**0**	**103**	**0**
		1	Upper limit	NA	ND	NA	1.000	ND	100.000				**100**		
		2	Lower limit	NA	ND	NA	10	ND	300.000				**3**		
7			**All Main Sectors**							**0,000**	**0,259**	**0,000**	**119,516**	**0**	

* Emission factors based on ADt

** Based on TJ burned. The emission factor based on volume burned is 0.0003 µg TEQ/m³

Estimation of annual releases for pulp and paper manufacture using concentrations in water and residues

Cat.	Subcat.	Class	Sub-categories	Potential Release Route		Discharge (L for water)	Discharge (t for sludge)	Annual release	
				Water (pg TEQ/L)	Residue (µg TEQ/t sludge)			Water g TEQ/a	Residues g TEQ/a
			Pulp and Paper Industry						
			Acqueous discharges			**0**	**0**	**0,000**	**0,000**
		1	Kraft process, Cl2 gas, non-wood fibers, impacted	300	ND			**0,000**	
		2	Kraft process, old technology (Cl2)	70	100			**0,000**	**0,000**
		3	Kraft process, mixed technology	15	30			**0,000**	**0,000**
		4	Sulfite pulp/papers, old technology	2	ND			**0,000**	
		5	Kraft process, modern technology (ClO2)		10				**0,000**
		6	Sulfite papers, new technology (ClO2, TCF)		ND				
		7	TMP pulp						
		8	Recycling papers from contaminated waste papers*	30	30			**0,000**	**0,000**
		9	Recycling pulp/paper from modern papers	ND	ND				

***** **Wastewater from drinking system; combined drinking and fiber sludges**

change from negative exponent to decimal

new denomination and class 3 introduced for PVC only

Source: Dönkasan Ltd.Şti, 2002; State Planning Organization, 2002; Petkim, 2002.

Category 8. Miscellaneous

Dry cleaning is one of the dioxin/furan sources for this category, but there is no sufficient information on the use of chlorine base solvents (such as perchlorethylene, tetrachlorethylene etc.) in Turkey. According to the data obtained from the Istanbul Chamber of Dry Cleaners, the number of dry cleaners active in Istanbul are about 1,000, with perchloretylene consumed annually at those facilities 330 tons. For the entire Turkish dry cleaning sector, the annual perchloretylene consumption is estimated to be approximately 1,000 tons.

The other important dioxin source is tobacco smoking. According to Turkish Tobacco Corporation, the total of cigarette sales in Turkey is 67.321.000.000 for the year 2002, and this value do not represent the private sector sales (12). Private sector market share is considered to be about 30%, so they add around 30.000.000.000 cigarettes for private sector.

According to the information given above, the total PCDD/Fs emissions produced by miscellaneous activities are given in Table 45.

Category 9. Disposal/Landfilling

According to the Waste Disposal and Recycling Facilities Statistics published by the Turkish Statistics Institution in 2006, a total of 25 waste disposal facilities exist in Turkey, including 18 regular storage facilities, 3 incineration facilities and 4 composting facilities, operated by or in the name of the municipalities. These facilities have a total storage capacity of 309.5 million tons, and as of 2005, the total amount of wastes disposed of through regular storage is 7.1 million tons. Apart from these facilities, excluding some waste storage area studies, the majority of the municipalities in Turkey do not environmentally compatible have waste storage areas.

In Turkey, as of 2005, at 13 of those 25 disposal and recycling facilities, 85% of the total of 1.583.519 m^3 waste leakage water is discharged after treated at facilities, while the remaining 15% is discharged without treatment to the city wastewater system. In 8 facilities, the collected leakage water is pumped back on the wastefills, whereas in 2 facilities the leakage water is evaporated. In 2 incineration facilities, waste leakage water collection systems do not exist (Table 45 A).

For sewage treatment, Turkey has a lot of wastewater treatment plants, which use chlorine for disinfection. According to Water Pollution Control Regulation dated 1988, Hazardous Waste control Regulation dated 1995 and Soil Pollution Control Regulation dated 2001; wastewater treatment is strictly regulated and controlled by the Ministry of Environment and Forestry. So, the only problem for wastewater treatment sector is the lack of limit values determined with regulations in the aspect of POPs..

Composting of some garden wastes and some animal wastes is very limited in Turkey because of high investment costs of composting process. Some SMEs in Istanbul and Izmir (Photo 5) produce compost from garden wastes. Apart from those facilities, a total of 339.351 tons of waste has arrived at 4 compost facilities (with a total annual capacity of 606.000 tons) operated by the municipalities, according to 2005 TUIK data. After the sorting-out operations, a total of 165.351 tons of waste have been received into the composting units, and 29.256 tons of compost have been produced. 160.806 tons of non-compostable waste have been transferred to regular storage facilities.

Table 45. Total PCDD/Fs emissions produced by miscellaneous activities, Year 2006

Cat.	Subcat.	Class	Sub-categories	Potential Release Route (µg TEQ/t)					Production	Annual release				
				Air	Water	Land	Product	Residue	t/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a	g TEQ/a
8			**Miscellaneous**							**Air**	**Water**	**Land**	**Product**	**Residue**
	a		**Drying of biomass**						**0**	**0,000**	**0**	**0**	**0,000**	**0**
		1	Clean wood	0,007	NA	ND	0,1	ND		**0,000**			**0,000**	
		2	Green fodder	0,1	NA	ND	0,1	ND		**0,000**			**0,000**	
		3	PCP- or otherwise treated biomass	10	NA	ND	0,5	ND		**0,000**			**0,000**	
	b		**Crematoria**						**0**	**0,000**	**0**	**0**	**0**	**0,000**
		1	No control (per cremation)	90	NA	NA	NA	ND		**0,000**				
		2	Medium control (per cremation)	10	NA	NA	NA	2,5		**0,000**				**0,000**
		3	Optimal control (per cremation)	0,4	NA	NA	NA	2,5		**0,000**				**0,000**
	c		**Smoke houses**						**0**	**0,000**	**0**	**0**	**0**	**0,000**
		1	Treated wood, waste fuels used as fuel	50	NA	ND	ND	2.000		**0,000**				**0,000**
		2	Clean fuel, no afterburner	6	NA	ND	ND	20		**0,000**				**0,000**
		3	Clean fuel, afterburner	0,6	NA	ND	ND	20		**0,000**				**0,000**
	d		**Dry cleaning residues**						**1.000**	**0**	**0**	**0**	**0**	**0,050**
		1	Heavy textiles, PCP-treated, etc.	NA	NA	NA	NA	3.000						**0,000**
		2	Normal textiles	NA	NA	NA	NA	50	1.000					**0,050**
	e		**Tobacco smoking**						**128.278**	**0,0000**	**0**	**0**	**0**	**0**
		1	Cigar (per item)	0,3	NA	NA	NA	NA		**0,0000**				
		2	Cigarette (per item)	0,1	Na	NA	NA	NA	128.278	**0,0000**				
8			**Miscellaneous**							**0,000**	**0**	**0**	**0,000**	**0,050**

Source: Tekel Genel Müdürlüğü, 2002 and SIS, 2000 (Private sector cigarette sales).

Table 45 A Regular Storage Facility

Regular storage facility	
Number	18
Capacity (thousand tons/year)	309 513
Incoming waste amount (thousand tons)	7 136
Dangerous waste amount (thousand tons)	39
Non-dangerous waste amount (thousand tons)	7 097
Total waste disposal through regular storage method (thousand tons)	7 078
Dangerous waste amount (thousand tons)	38
Non-dangerous waste amount (thousand tons)	7 040
Incineration facilities	
Number	3
Capacity (thousand tons/year)	44
Incoming waste amount (thousand tons)	31
Total waste disposal through incineration method (thousand tons)	30
Ash and slag amount outputted by the facility (thousand tons)	6
Number of energy recycling facilities	2
Generated electricity amount (MWh)	11 212
Compost facilities	
Number	4
Capacity (thousand tons/year)	606
Incoming waste amount (thousand tons)	339
Composted waste amount(thousand tons)	165
Produced compost amount (thousand tons)	29
Waste leakage water amount (thousand m^3)	1 584
Waste leakage water discharge amount after treated at the facility (thousand m^3)	1 347
Untreated waste leakage water discharge amount(thousand m^3)	237

Source:TUIK, Waste Disposal and Recycling Facilities Statistics Report, 2006

According to the information given above, the total PCDD/Fs emissions produced by Disposal/Landfilling are given in Table 46.

Photo 5. Compost production in Izmir, Turkey

Table 46. Total PCDD/Fs emissions produced by Disposal/Landfilling

Cat.	Subcat.	Class	Sub-categories	Potential Release Route (µg TEQ/t) Air	Water µg TEQ/m³	Land	Product	Residue µg TEQ/m³	Production	Annual release g TEQ/a Air	g TEQ/a Water	g TEQ/a Land	g TEQ/a Product	g TEQ/a Residue
9			**Disposal**											
	a		**Landfill leachate**						**237.527**	**0**	**0,048**	**0**	**0**	**11,87635**
		1	Hazardous waste *	NA	0,2	NA	NA	50	237.527		**0,048**			**11,87635**
		2	Non-hazardous waste *	NA	0,03	NA	NA	6			**0,000**		**0**	**0**
	b		**Sewage/sewage treatment**						**0**		**0,000**	**0**	**0**	**1,000**
		1	Industrial, mixed domestic with chlorine relevance	NA					*0*		*0,000*	*0*	*0*	*1,000*
			No sludge removal	NA	0,005	NA	NA	1.000			**0,000**			**0,000**
			With sludge removal	NA	0,0005	NA	NA	1.000			**0,000**			**1,000**
		2	Urban environments	NA					*0*		*0,000*	*0*	*0*	*0,000*
			No sludge removal	NA	0,002	NA	NA	100			**0,000**			**0,000**
			With sludge removal (t/a)	NA	0,0005	NA	NA	100			**0,000**			**0,000**
		3	Remote and residential or modern treatment plant	NA	0,0001	NA	NA	10			**0,000**			**0,000**
	c		**Open water dumping**						**0**	**0**	**0,000**	**0**	**0**	**0**
		1	Mixed domestic and industrial inputs	NA	0,005	NA	NA	NA			**0,000**			
		2	Urban environments	NA	0,0002	NA	NA	NA			**0,000**			
		3	Remote environments or input control	NA	0,0001	NA	NA	NA			**0,000**			
	d		**Composting**						**29.000**	**0**	**0**	**0**	**0,145**	**0**
		1	All organic fraction	NA	ND	NA	100	NA					**0,000**	
		2	Garden, kitchen wastes	NA	ND	NA	15	NA					**0,000**	
		3	Green materials,not impacted environments	NA	ND	NA	5	NA	29.000				**0,145**	
	e		**Waste oil disposal**						**0**	**0**	**0**	**0**	**0**	**0**
		1	All fractions	ND	ND	ND	ND	ND						
9			**Disposal/Landfill**							**0,000**	**0,048**	**0**	**0,145**	**12,87635**

***** no sludge removal: Sludge that is lost in the piping system or deposited and removed has to be estimated. There is no general formula provided (2006).

Source: KTS Compost Product Trade Co., SPO, 2006, İzmir

Category 10. Identification of Hot Spots

Polychlorinated biphenyls are subject to the Part II of Annex A of Convention, where following obligations are anticipated:

Each party:

(a) With regard to the elimination of the use of polychlorinated biphenyls in equipment (e.g. transformers, capacitors, or other receptacles containing liquid stocks) by 2025, subject to review by the Conference of the Parties, take action in accordance with the following priorities:

> (i) 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;
>
> (ii) Make determined efforts to identify, label, and remove from use equipment containing greater than 0.05 per cents polychlorinated biphenyls and volumes greater than 5 liters;
>
> (iii) Endeavor to identify and remove from use equipment containing greater than 0.005 per cent polychlorinated biphenyls and volumes greater than 0.05 liters;

(b) Notwithstanding paragraph 2 of Article 3, ensure that equipment containing polychlorinated biphenyls, as described in subparagraph (a), shall not be exported or imported except for the purpose of environmentally sound waste management;

(c) Except for maintenance and servicing operations, not allow recovery for the purpose of reuse in other equipment of liquids with polychlorinated biphenyls content above 0.005 per cent;

(d) Make determined efforts designed to lead to environmentally sound waste management of liquids containing polychlorinated biphenyls and equipment contaminated with polychlorinated biphenyls having a polychlorinated biphenyls content above 0.005 per cent in accordance with paragraph 1 of Article 6 as soon as possible but not later than 2028, subject to review by the Conference of the Parties.

Because of lack of information, it is not possible to evaluate the release and importance of Polychlorinated biphenyls (PCBs) and equipment containing PCBs for Turkey. Because of manual registration procedure, the total number of transformators or other equipments entered Turkey is not known. According to Turkish Electricity Production Corporation, Turkey has 290 transformers and as other equipment 1972 capacitors which contain PCBs as insulator liquid in different cities and the total amount of PCBs in these equipment, including private sector is about 200 tons. The total emissions of PCBs containing equipment are given in Table 47. As mantioned in part 2.3.2 (page 65) , after completion of inventory of PCB containing equipment, more detailed conjecture about PCB emissions will be possible.

Table 47. Total PCB Emissions for Hot Spots, Year 2006

Cat.	Subcat.	Class	Sub-categories	Product (µg TEQ/t)	Occurrence (t)	g TEQ identified				
						Air	Water	Land	Product	Residue
10			**Identification of Hot Spots**			x indicates need for site-specific evaluation				
	a		**Production sites of chlorinated organics**							
		1	Chlorophenols and derivatives or PCB				x	x		
		2	Other chlorinated organics					x		
	b		**Production sites of chlorine**							
		1	with graphite electrodes				x	x		
		2	without graphite electrodes				x	x		
	c		**Formulation of chlorinated phenols/pesticides**				x	x		
	d		**Application sites of dioxin-contaminated pesticides**					x		
	e		**Timber manufacture**							
		1	Using pentachlorophenol, other dioxin-containing preservatives				x	x		
		2	No use of PCP, not open to the environment				x	x		
	f		**PCB containing equipment**		**200**				**3**	
			Low chlorinated, e.g., Clophen A30, Aroclor 1242	15.000	200				**3**	
			Medium chlorinated, e.g., Clophen A40, Aroclor 1248	70.000					**0**	
			Medium chlorinated, e.g., Clophen A50, Aroclor 1254	300.000					**0**	
			High chlorinated, e.g., Clophen A60, Aroclor 1260	1.500.000					**0**	
		1	Leaching				x	x		
		2	Not leaching				x	x		
	g		**Dumps of waste/residues from categories 1-9**				x	x		
	h		**Sites of relevant accidents**				x	x		
	i		**Dredging of sediments**				x	x		
10			**Hot spots**						**3**	**0**

Table 48 Dioxin and furan emissions (g TEQ/year) in Turkey (2006)

Cat.	Source Categories	Annual Releases (g TEQ/a)				
		Air	Water	Land	Product	Residue
1	Waste Incineration	62,8	0,0	0,0	0,0	1,3
2	Ferrous and Non-Ferrous Metal Production	624,7	0,0	0,0	0,0	675,4
3	Heat and Power Generation	143,3	0,0	0,0	0,0	4,7
4	Production of Mineral Products	245,6	0,0	0,0	0,0	0,0
5	Transportation	21,5	0,0	0,0	0,0	0,0
6	Open Burning Processes	151,0	0,0	96,0	0,0	0,0
7	Production of Chemicals and Consumer Goods	0,0	0,3	0,0	119,5	0,4
8	Miscellaneous	0,0	0,0	0,0	0,0	0,1
9	Disposal	0,0	0,0	0,0	0,1	12,9
10	Identification of Potential Hot-Spots				3,0	0,0
1-9	**Total**	**1248,9**	**0,3**	**96,0**	**122,7**	**694,7**
	Grand Total	**2162**				

Need for adoption and control for regulations, published by different Ministries will be performed by this way (5,6,7)[9]. For example, although Turkey has revised Waste Oil Control Regulation in the 2004 for adopting EU Directive on Waste Oil Control , it is necessary to consider in the action plan also requirements resulting for Turkey from the legislation of the European Union *(Regulation 96/59/EC on Disposal of PCBs and PCT and Directive of the European Council and Parliament on Implementation of the Stockholm Convention*), so for implementation of this Directive, national laboratories should be supported for infrastructure and also for analysis experience.

Actions for Turkey

- Capacity building of National Laboratories on POPs Analysis
- Dioxin and Furan inventories for selected sectors in Turkey. Studies about BAT/BEP usage in sectors, primarily ferro and non-ferro metallic and chemicals which producing dioxin, must be started.
- Detailed inventory on PCB Containing Equipments and Environmentally Sound Management
- HCB inventory (history, use, storage etc.)
- Risk assessment for POPs emissions in Turkey

2.3.5 Information on the state of knowledge on stockpiles, contaminated sides and wastes, identification, likely numbers, relevant regulations, guidance, remendiation measures and data on releases from sites.

Effective management of 12 Persistent Organic Pollutants – POPs- (namely, aldrin, chlordane, dieldrin, endrine, heptachlor, mirex, toxaphene, DDT, hexachlorobenzene, PCBs, dioxins, and furans) is a crucially important issue, globally. They are persistent in the environment, can travel long-distances and accumulate biologically so, these persistent organic polluters must be eliminated, if not, their use must be restricted or banned.

[9] 5. Ministry of Environment and Forestry www.cevreorman.gov.tr
6. Ministry of Agriculture of Rural Affairs www.tarim.gov.tr
7. Ministry of Health www.saglik.gov.tr

In order for Turkey to take necessary measures about POP's, determination of contaminated areas, the condition of POP's stocks, the amount of used POP's and, valid and accurate formation of the inventories, regarding to administrative and technical infrastructure must be undertaken. In this regard, surveys were made by the task team in the organizations, institutions, and industrial corporations. In addition, literature review, analysis of the data are studied and all inventories are gathered and presented in this report.

In general, six different potentially contaminated areas and issues can be identified in Turkey. These are:

- DDT storage area in Ankara;
- HCH and DDT storage area in Kocaeli;
- PCBs containing transformers area in Kahraman Maraş, Kütahya and Elazığ region (need further studies);
- Hazardous wastes, (including POPs) in barrels stored between Sinop and Samsun area;
- The contaminated or potentially contaminated areas in the Black Sea and Mediterranean Sea need further studies.

In addition, it is known that some equipment containing PCBs exist in the private sector. However, due to the difficuly of obtaining their inventories, they could not be sufficiently included in this report.

In the last 50 years, around the world as a consequence of rapid development in modern production techniques, chemicals and products, containing these chemicals were produced widely in order to increase agricultural production and as a result of their use, they became diffused into the environment. The main course of these chemicals is pesticides, herbicides, fungicides, polychlorinated biphenyl (PCBs), polychlorinated dibenzodioxin, and various synthetic organic halogen hydrocarbons. In the last 25 years, many of the developed countries banned especially the use of organic chlorinated hydrocarbon pesticides. However, persistent properties of these compounds in the environment, without decomposing, caused not only accumulation of these pesticides in various human and animal bodies, but also encounter these compounds even in the non-exposed areas. The reason is, due to persistent character and long-range effects of organic chlorinated hydrocarbon pesticides.

As a result of the information above, obligation for a an international framework that is shared and accepted by many nations to eliminate the negative effects of these compounds and protect human and environment health has risen. UNEP (United Nations Environment Programme) agreed upon further development of the programmes such as, reducing or eliminating release and amount of 12 POP's, which are highly toxic both for human and environmental health. In this sense, Stockholm Convention on POP's was prepared.

After 1940's, especially chemicals belonging to the Organic Polychlorinated hydrocarbon, pesticide group, such as DDT, Heptachlor, Chlorade, Aldrin, Dieldrin, Endrine and Toxaphene were used in large amounts in Turkey. Today the use of these chemicals are banned in more than 70 countries around the world. They were forbidden in Turkey at the beginning of 1980s. In spite of disposal of the use of these chemicals through prohibition, because of their persistent character, they continue to threaten the environment and human health.

Bio-monitoring studies, conducted in specific periods show that exposure of these compounds still exist, even though they aren't used in Turkey for 25 years. The reasons of this exposure are their persistent character in the environment without completely decompose, their accumulation in fatty tissues of organisms and in the food chain.

In order to limit or where possible, eliminate the negative effects of POP's, restriction or prohibition of the production and use of these chemicals, environmentally suitable disposal of POP's stocks and cleansing the polluted areas are needed.

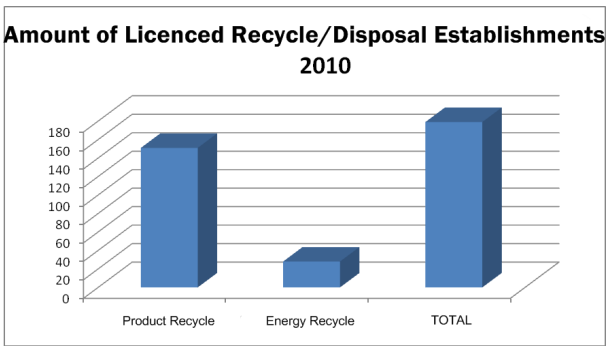
In this sense, the task team searched for information regarding the stocks of POPs to be able to determine both the character and the amount of the contaminated areas.

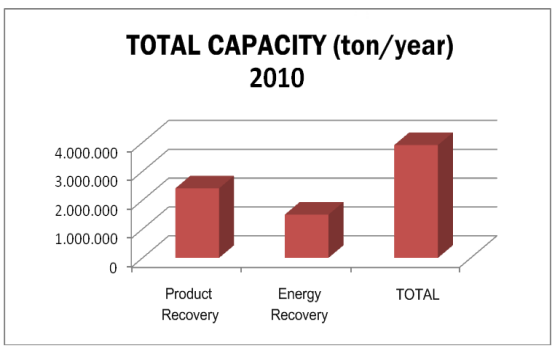
The objective of this research: Determining POP's contaminated areas and country's priority concerns and necessary plans, regarding disposal of these chemicals.

Preliminary inventory of stocks and contaminated sites; assessment of opportunities for disposal of obsolete stocks and sites contaminated with POPs are:

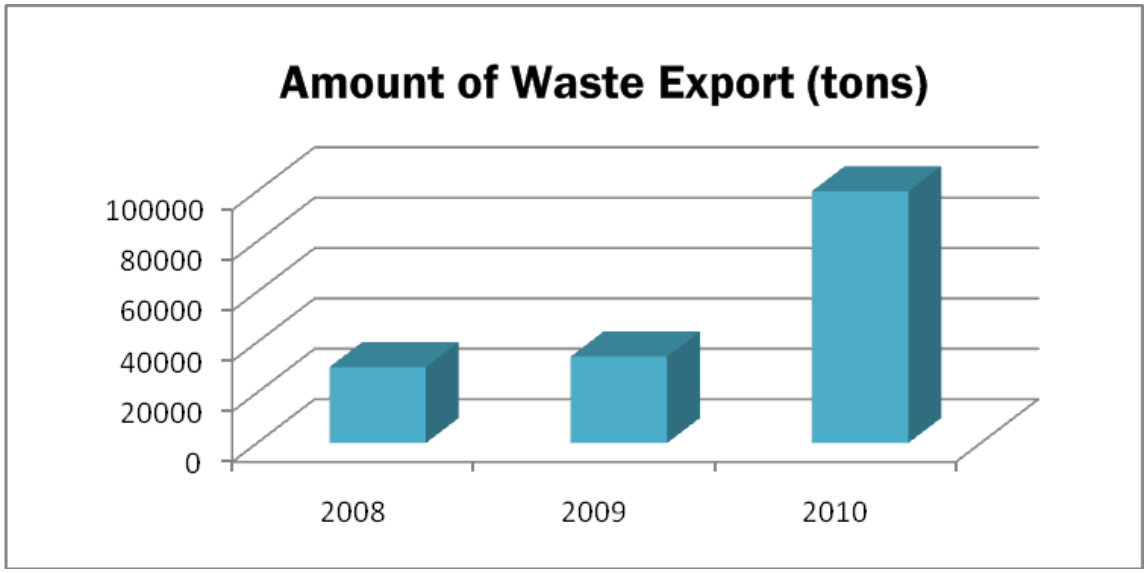
Waste amount and licencing works of recycle/disposal companies :

Dangerous waste as a result of industry is collected and recycled by means of "Regulation on Control of Dangerous waste". Licences has given to 151 establisments, having total capacity of 2.410.000 tons per year, in order to recycle dangerous wastes. Furthermore, 30 cement plants having approximately 1.500.000 tons of capacity, have been licenced by our ministry, making total recycle/disposal facilities 181 with a total capacity of 3.910.000 tons per year.





Disposal of dangerous wastes in foreign countries are committed by means of basel convention with notification process ongoing. Thus, 30.192 tons in 2008, 34,338 tons in 2009, 103,940 tons in 2010 of dangerous waste were applied for disposing abroad as the process for notification by means of Basel Convention and export procedures related to that is ongoing.



In our country, there are 3 dangerous waste incineration plants and 3 dangerous waste storage facilities for disposing dangerous waste.

Incirlik Military Base

Until 1988, Waste oil with PCB, that comes from other establishments in Turkey were stored in containers at the Incirlik base. It was understood that there was an oil leak during the storage period in 1988, while the containers were being transferred. As a result, the use of the stocking area was ceased at the end of 1988. There was a series of research conducted, in order to eliminate the contamination from the area between March 1990; June 1992 and November 1993 and a project was prepared, aiming at improving this area and reopening it for further use. LAW, the subcontractor company of the Environment Department in USA Air Forces Base and Middle East Technical University Environmental Engineering Department carried out this project together. The goal of the project was to reveal the methods and alternatives in eliminating the contamination, which would be agreed by both the Governments of European Union and Turkey.

In 2001, all of the contaminated soil in the area, which was polluted by PCBs, was exported to abroad, aiming elimination. Landscape of the evacuated land was completed and the area was reopened as a green space. The kind and amount of waste, disposed in 2001 is shown in Table 49.

According to these results and official declarations, at present there is no contaminated areas in any military bases or areas originated from PCBs and PCBs containing equipments in Turkey. In the samples taken from these areas, the PCB concentration is determined to be 28 ppb (0.028 mg/kg). This value is much lower than the limit (0.5 mg/kg) specifed at the Regulations for the Control of Soil Contamination.

Table 49 Disposed wastes and their amounts

WASTE	Contamination Level	Containers	Number of Containers	Total Volume (Yard3/m3)
Contaminated site with PCB	50 ppm and over	Barrel	170	45/34.35
Contaminated site with PCB	10ppm-50ppm	Container	12	60/45.80
Contaminated site with PCB	1ppm-10ppm	Container	9	45/34.35
Pressed Barrels	------	Wooden Barrel	19	unknown

Polychlorinated Biphenyls (PCBs)

Hexachlorohexanee (HCH) is used for seed disinfection as a fungicide in agriculture, as mentioned before. At the same time, they are by-products that are formed during productions of organic chloride substances, like chloride solvent and PVC. It is a product of volatile ashes, released from incinerator facilities and gases of the chlor alkaline facility, which together, form a polluted environment. Their production and use are banned in 1985, by the Ministry of Agriculture and Rural Affairs.

Polychlorinated biphenyl (PCBs) are organic compounds, which were used for electric machinery insulation. They have been used as insulators in almost every transformer production, for years. PCB's can also appear as unwanted by-products of organochloro productions like PVC production and waste incineration.

Because of their aromatic structure, chloride content, and accumulation in the body, they are considered risky chemical substances. However, their use in completely closed systems causes no negative effects on environment and humans.

The negative effects appear when food and drinks are consumed containing PCBs; it can be inhaled, swallowed, or absorbed by skin. If they are burned under inappropriate conditions, the products of the burning process do not give complete burning products but give (Polychlorinated dibenzo-p-dioxins (PCDD) and Polychlorinated dibenzofuran (PCDF)), which have more harmful effects to human beings and environment.

The effect of PCBs on the majority of the population is based on contaminated food. The researches, conducted on humans in the industrialized countries revealed μg levels of PCBs. It has been reported that this kind of exposure level doesn't cause any illness.

It is also found that when substances with PCBs were dumped into the rivers, lakes etc, they were accumulated in fish and the people who consume these fish would show the same symptoms. According to the results of researches conducted, exposure to PCBs and gases, which are released as a consequence of burning under inappropriate conditions, affects skin, respiratory, digestive, and nervous systems.

In the scope of this project, an official letter was prepared and sent to the institutions, which were assumed to have PCBs; obtained inventories are documented in Report of the Research Task Team. Many non-public institutions replied that they have not any PCBs containing transformers at present.

The transformers and capacitors with PCBs in Electricity Generation, and Turkish Electricity Transmission Corporations.

According to the research carried out by Turkish Electricity Transmission (TEIAS), Generation (EUAS) and Transmission Corporations regarding PCB containing transformers and capasitors, there are 290 transformers and 1972 capacitors containing PCB's present in Turkey of those 1972 capacitors belong to TEIAS. EUAS has 187 transformers of those 138 were disposed and 43 were contracted for disposal and only 6 left by September 2010. Up to date, TEDAS examined and labeled of about 145.480 transformers. PCBs isolation fluids have been replaced by silicon oil or esthered compounds or dry transformers used.

PCB containing transformers have been partially withdrawn from service and replaced by new ones, and the PCBs containing transformers have been disposed of along with their isolation liquids.

Some of the transformers are scattered to different locations. Some of the transformers are scattered to different locations. The majority are disposed however further studies are necessary in order to determine whether these transformers cause contamination or not.

HCH and DDT in Kocaeli

There are no POPs pesticides, other than DDT and HCH in Turkey, based on the information provided on POPs pesticides and stocks. When pesticides were banned in Turkey, stocks of HCH and DDT, were collected, as a precautionary step by the Ministry.

As long as pesticides were banned and restricted in Turkey, necessary measures were taken and use of pesticides like aldrin, dieldrin, heptachlor, DDT, chlordane, toxaphen have been restricted, since 1968. Soil treatment by using aldrin and heptachlor was banned, but seed treatments were permitted. Use of DDT on vegetable and fruit trees was restricted, while usage against olive moth, while the trees are in the flowering period and against prodenia in cotton were allowed. In those years, there was no decision against the use of HCH. However, as a result of using agricultural chemicals, HCH residues on plants and DDT on straws were found and so a warning has been issued to take necessary measures in 1985.

Approximately, 2700 tons of HCH (Hexachlocyclohexane or γ-HCH) and DDT in sacks and barrels were stored in Derince, Kocaeli.

This substance, which was in white powder form and preserved in 50 kg nylon bags and barrels to use for agricultural protection. In 1985, the General Directorate of Protection and Control of Ministry of Agriculture and Rural Affairs, according to the (Law for Agricultural Protection, Law no. 6968) forced this product to be stored in storage house.

Disposal of 2700 tons of HCH inside Merkim Industrial Products Inc.'s depots stored inside bags and barrels for their existence is a danger to human and environmental health was decided by MoEF .

To do this, under coordination with MoEF , Kocaeli Industrial Association (KIA) was signed an agreement with Merkim Inc. as responsible parts in 24.11.2006 . In this agreement , KIA is

director and coordinator for funds , donations and assistances which is formed by Merkim Industrial Products Inc. and industrialists and İZAYDAŞ A.Ş. is responsible as tecnical consultant . As a result of former studies, it is found to be appropriate to dispose HCH in Germany and an agreement was signed between German AVG corporation and KIA in 03.04.2007.

To reach that goal, notification process started in accordance with Basel Convention on Transboundary movement and Disposal of Dangerous waste which our country take part, notification forms prepared by KIA were approved by MoEF as competent authority, started to send to Germany. Thus 6 notification processes been done in separate dates, sending of total mass of 313.4 kg HCH to Germany completed by last shipment in 13.08.2009.

In an official documant dated 08.04.2010 coded 39/1147 from KIA; it is declared that problems in conducting the operation arisen because of insufficience in funding by means of the protocol signed in 24.11.2006 and setting up of plans in time by Merkim Industrial Products Inc. demanded by AVG corporation , contract with the AVG corporation is about to cancelled by KIA's resolution dated 17.03.2010 and coded 59.

Merkim Industrial Products Inc. was informed about cancellation of the agreement by Environment and Forestry directorate of Kocaeli province and asked to take action immediately with an official article dated 16.04.2010 coded 145-01-3201. By these means there is a search for export opportunities for wastes under control of technical staff of Environment and Forestry directorate of the province in sealed warehouses, notification process for 100 tons of waste was started by 01.11.2010 for prior disposal in Germany.

Illegally dumped hazardous waste in barrels along the Black Sea Coast

Extensive quantities of hazardous waste, including POPs in barrels, which were dumped illegally has been found by the Turkish Authorities in the area between Sinop and Rize, along the Black Sea coast in 1988 and about 80 percent of them were in the area between Sinop and Samsun.

Turkey became a party to the Basel Convention on the Control of Transboundary Movements of Hazardous Wastes and their disposal in 1994. Turkey has a national regulation on Hazardous Waste Management and it became in to force in 1995.

The storage conditions of these barrels were very poor. Most of the metal drums have became heavily corroded and waste materials were contaminating the concrete and soil around the area. In order to protect human health and environment, disposal of the absolete stocks and the contamination studies were urgently needed.

These waste containing barrels were first found on August 4, 1988 at the Black Sea Coast, and they continued to run ashore until the end of 1988. Of these 367 barrels, 215 are full and 152 empty. On the barrels, the sign ‘R’ (Hazardous Waste) is shown, and there are inscriptions in Italian. The analysis of their contents has determined that they are toxic chemical waste.

These barrels are preserved at two relevant and protected storage facilities in Samsun-Alaçam and Sinop.

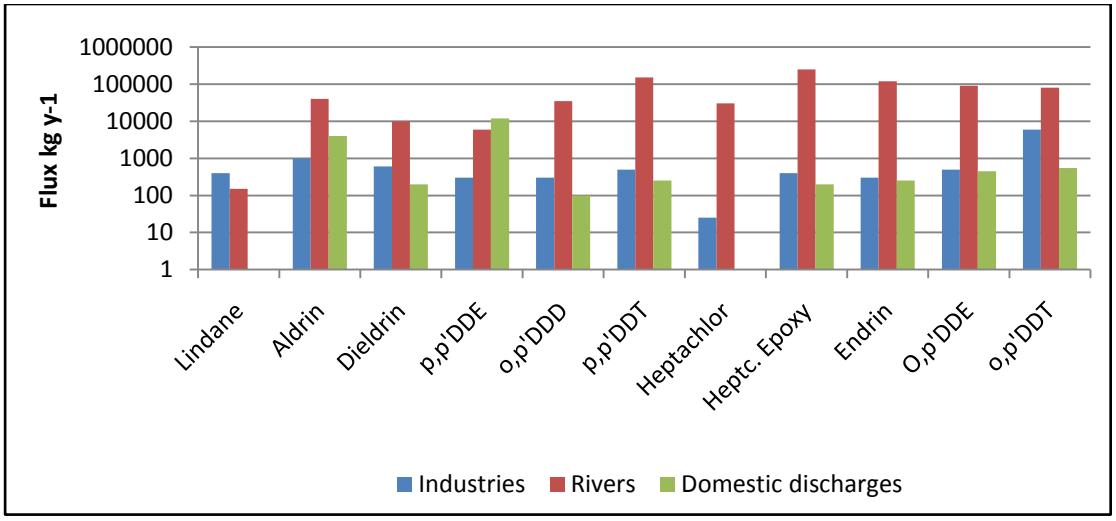
Since the Italian Government has refused to take back the barrels, MoEF, with the assistance of IZAYDAS and "the financing needs to be met by the Turkish Cement Producers' Union", has placed the barrels in standart barrels which allow them to be shipped at internationally accepted standards, filled in the No.TR-2007-013 Notification Form in accordance with the Basel Convention principles, and has shipped them to the facilities of the SAVA GmbH&Co K.G. in Germany. They have been disposed of on May 8, 2007 at these facilities.

POPs Contamination in the Black Sea and Mediterranean Sea

The Black Sea, which is located at the north of Turkey, has an area of 422.189 km^2 and a depth of 2200 m. watershed area carries the water from important industrial and agricultural regions where 80-100 million people from 9 countries live. In the past years, Black Sea has been highly contaminated sea transportation without any restrictions, mineral processing, dumping of toxic wastes, discharging domestic waste and toxic substances, carried by rivers. The rivers, contaminating the Black Sea are Danube (203 km3/yr), Dnepr (54 km3/yr), Dniesta (9.3 km3/yr), Don (28 km3/yr) and Kuban (13 km3/yr).

Pesticide residues were also found in the sea water. Samples, gathered from the coasts of Black Sea were analyzed and 11 types of pesticides are found and shown in Fig.3. (TUNCER G. 1998)

Figure 3 Pesticide discharge into the Black Sea



The most important sources of contamination in the Black Sea are the discharge of pesticides which is shown in Table 50 (Kurt PB and Özkoç HB 2004).

Significant amounts of chloride pesticides and PCBs were found in the sea water and mussel samples are taken from the Black Sea, by Kurt and his team. Chlorinated pesticides and PCBs concentrations determined in mussel samples, taken from Turkish coasts of Central Black Sea Region are indicated in Table 51 and chlorinated pesticides and PCBs concentrations, determined in the sea water are also shown in Table 52.

Table 50 Discharge of pesticides to the Black Sea coasts of Turkey

	Heptachlor	Aldrin	Dieldrin	Endrin	p.p'DDE	o.p'DDE	o.p'DDD	o.p'DDT
Sakarya River	<11.200	8.400	25.300	112.000	21.000	296.000	105.000	29.000
Guluc Stream	2.200	110	680	500	50	610	340	750
Neyren Stream	90	22	55	75	13	90	95	90
Kilimli Stream	9.6	<1	3.7	<3	0.1	7.1	4.1	9.7
Catalagzi Stream	90	41	<30	27	<24	<24	<30	<30
Filyos River	2.400	<1.700	310	200	670	1 .200	210	420
Bartın Stream	740	18	70	42	29	95	24	52
Kızılırmak River	<23.000	920	3.500	53.000	840	14.000	7.800	23.300
Yeşilırmak River	92	330	410	8.700	170	3.400	860	1.400
Milic Stream	310	43	13	<12	<2	<3	<2	<3
Civil Stream	30	1.7	<4	<24	200	<4	<5	<5
Melet Stream	500	170	131	940	420	700	340	940
K.Gure Stream	3.9	1.1	1.7	3.2	8.6	1.7	1.3	2.9
Aksu Stream	6.100	740	110	220	35	170	270	330
Tabakhane Stream	50	2.3	12	15	4.6	16	21	18
Değirmendere Stream	11	<500	20	620	4	230	90	290

Table 51 Chlorinated pesticides and PCBs concentrations determined in mussel samples

(Average concentrations of chlorinated pesticides and PCBs in mussels from the Mid-Black Sea Coast of Turkey in 1999 and 2000)

Compound	Baruthane (1), Pg/g ww¶	Yeşil Fener (2), Pg/g ww¶	Kırmızı Fener (3), Pg/g ww¶	Belediye Evleri (4), Pg/g ww¶	Sinop (5), Pg/g ww¶	Yalıköy (6), Pg/g ww¶
α-HCH	5	Nd	8	600	190	50
β-HCH	12	13	70	3900	22	140
γ-HCH	3	18	8	Nd	nd	Nd
Δ-HCH	2	1	200	Nd	nd	30
P,p'-DDT	290	400	240	1800	1100	Nd
P,p'-DDE	2800	300	70	2400	230	120
P,p'-DDD	950	850	2200	1000	240	5400
Dieldrin	780	180	130	600	380	360
Endosulfan-I	4000	Nd	600	16,000	80	20
Endosulfan sulphate	5700	Nd	790	3400	nd	7
Endrin	180	310	180	1500	190	20
Endrin aldehite	1300	140	420	1200	nd	3
Heptachlor	110	20	14	1600	40	8
Heptachlor epoxide	Nd	Nd	Nd	Nd	nd	Nd
HCB	270	170	Nd	Nd	180	Nd
Lindane	130	160	Nd	Nd	120	Nd
Aldrin	590	Nd	70	Nd	nd	Nd
Endosulfan-II	270	2100	Nd	11,000	12	2
PCBs	Nd	Nd	Nd	Nd	nd	Nd

Yeşil Fener (2) and Kırmızı Fener (3) sampling points are in the harbour along Samsun Coast, Baruthane (1) is on the west part of Samsun coast and Belediye Evleri (4) are on the east part of Samsun Coast. nd= Not detected ¶Bolded numbers are below detection limit. Pg/g ww= Pollutant in terms of average concentration per g of wet weight

Table 52 Chlorinated pesticides and PCBs concentrations determined in the Black Sea water

(Average concentration of chlorinated pesticides and PCBs in seawater from the Mid-Black Sea Coast of Turkey in 1999 and 2000)

Compound	Baruthane (1), Pg/ml¶	Yeşil Fener (2), Pg/ml¶	Kırmızı Fener (3), Pg/ml¶	Belediye Evleri (4), Pg/ml¶	Sinop (5), Pg/ml¶	Yalıköy (6), Pg/ml¶
a-HCH	0,6	Nd	1	Nd	nd	Nd
b-HCH	7	Nd	Nd	Nd	nd	Nd
g-HCH	Nd	0,3	Nd	Nd	nd	Nd
d-HCH	3	Nd	Nd	Nd	nd	Nd
P,p'-DDT	Nd	Nd	Nd	Nd	nd	Nd
P,p'-DDE	Nd	Nd	Nd	nd	1	Nd
P,p'-DDD	Nd	Nd	Nd	nd	105	Nd
Endosulfan-I	Nd	0,1	1	15	nd	Nd
Endosulfan sulphate	Nd	Nd	Nd	nd	nd	Nd
Endrin	Nd	Nd	Nd	nd	nd	Nd
Endrin aldehite	Nd	0,5	Nd	nd	15	Nd
Heptachlor	0,7	0,2	30	1	1	1
Heptachlor epoxide	Nd	Nd	Nd	nd	Nd	Nd
HCB	Nd	Nd	8	2	Nd	Nd
Lindane	Nd	Nd	Nd	nd	Nd	Nd
Aldrin	Nd	Nd	Nd	nd	Nd	Nd
Endosulfan-II	6	Nd	Nd	2	Nd	Nd
PCBs	Nd	Nd	Nd	nd	Nd	Nd

Yeşil Fener (2) and Kırmızı Fener (3) sampling points are in the harbour along Samsun Coast, Baruthane (1) is on the west part of Samsun coast and Belediye Evleri (4) are on the east part of Samsun Coast. nd= Not detected. ¶Bolded numbers are below detection limit.

DDT, DDE, and PCB were detected in the samples of fish and residues, taken from the coasts of Mediterranean Sea (Research done by Baştürk and his team). The amount of PCB in living organisms and residues were observed to be under detection levels. Concentration of organic chlorinated compounds in residue samples, taken from Mediterranean Sea are shown in Table 53, concentration of organic chlorinated compounds in homogenized fish samples are indicated in Table 54 and concentration of organic chlorinated compounds in living organism samples are shown in Table 55 (BAŞTÜRK Ö. 1980).

Table 53 Concentration of organic chlorinated compounds in residue samples

Residue	Concentration (mg/g)	Ng g^{-1} dry weight
á-HCH	1.8	0.1
â-HCH	0.2	0.7
pp'- DDE	1.9	2.7-+0.7
pp'- DDD	9.2	7-+4
pp'- DDT	16.1	13-+5.3
PCB-1260	208.6	180-+39

Table 54 Concentration of organic chlorinated compounds in homogenized fish samples

Residue	Concentration (mg/g)	Ng g^{-1} dry weight
Á-HCH	7.8	16-+7.4
B-HCH	37.7	41.3-+17.4
Aldrin	11.1	17.2-+4.1
pp'- DDE	56.4	296.0-+214
pp'- DDD	30.7	293.0-+227
pp'- DDT	40.0	370.0-+270
PCB-1254	1645.0	3220.0-+2830

Table 55 Concentration of organic chlorinated compounds in living organism samples

Species analyzed	No. of individuals analyzed	%EOM[a]	Organ chlorine residue (ng g^{-1}F.W.)			
			t-DDE[d]		t-DDT	t-PCB[b]
Mugil auratus (golden grey mullet	20	1.8	min	5	8	T[c]
			Max.	173	324	10
			Mean	48	89	-
Mullus barbatus(striped mullet)	26	16.0	min	2	9	T
			Max.	122	257	2
			Mean	62	130	-
Mullus surmeletus(red mullet)	6	2.6	min	7	20	-
			Max.	35	49	T
			Mean	21	34	-
Upeneus mollucensis(gold band goat fish))	26	16.0	min	31	49	T
			Max.	69	94	T
			Mean	47	74	-
Parapenaus kerathurus(shrimp)	26	16.0	min	3	4	T
			Max.	61	65	T
			Mean	28	34	T
Patella caerulea)	26	16.0	min	1	2	2
			Max.	4	7	39
			Mean	2	5	15

[a]% extractable organic material, based on fresh weight of living organism.
[b]The PCB calculations were based on the Aroclor 1254
[c]Trace indicates less than 2 ng g^{-1} [d]t-DDE is the sum of op- and pp-DDE

Some organic chloride polluters were found in the samples of fish taken from Marmara and Mediterranean Sea Research done by Coelhan and his team. According to this, considerable amounts of DDT were detected in the fish samples taken from Marmara Sea. It seems to be a very little difference between the amounts of 6 PCB congeners in the samples, taken from both Mediterranean and Marmara Sea (Table 56) (Coelhan and Barlas 1998).

Possible Contaminated and Priority Sites

As explained previously Possible contaminated sites need further study and sampling to identify the contaminated areas accurately.

- HCH and DDT storage area in Kocaeli;
- DDT storage area in Yenimahalle, Ankara;
- PCBs containing transformers area in Kahraman Maraş, Kütahya and Elazığ regions need further studies.
- Hazardous waste, including POPs in barrels stored between Sinop and Samsun area.
- Contaminated or possible contaminated areas in the Black Sea and Mediterranean Sea needed further studies.

Table 56 Amounts of 6 PCB congeners in the samples, taken from both Mediterranean and Marmara Sea

Compound	Marmara Sea					Mediterranean Sea				
	1	**2**	**3**	**4**	**5**	**6**	**7**	**8**	**9**	**10**
á- HCH	34	4	20	12	3	1	2	1	1	1
â- HCH	97	6	49	57	6	1,7	1	1	2	2
ã – HCH	n.d	3	15	8	2	1,2	4	n.d	1	1
PCB 28	n.d.	8	7	n.d	n.d	7,6	71	n.d	4	2
PCB 52	n.d	7	n.d	44	28	17,3	44	n.d	n.d	n.d
PCB 101	51	31	54	122	39	88	561	206	18	4
PCB 138	129	52	169	241	105	15	65	9	37	38
PCB 153	94	41	138	195	116	29	8,3	13	29	30
PCB 180	51	30	119	53	96	10	16,5	n.d.	14	16
o.p´-DDE	22	n.d.	n.d.	20	24	69	623	n.d.	n.d.	n.d.
p.p´-DDE	341	280	730	2448	372	230	576	115	231	305
o.p´-DDD	312	4	42	118	892	3,7	n.d.	n.d.	n.d.	25
p.p´-DDD	523	35	204	750	551	26	5	8	19	13
o.p´-DDT	116	18	38	260	95	31	48	n.d.	7	4
p.p´-DDT	165	36	228	494	110	16	42	2,6	43	44
Toxaphene Parlar No 26	24	n.d.	32	47	13	5	n.d.	n.d.	4	2
Toxaphene Parlar No 50	31	17	64	31	10	19	40	n.d.	11	5
Toxaphene Parlar No 62	11	4	72	36	6	7	116	35	10	5
HCB	31	2	26	32	24	2,4	15	7	7	6
Heptachlor	n.d.	2	25	n.d.	6	4	26	n.d.	n.d.	n.d.
á- Chlordene	n.d.	n.d.	n.d.	n.d.	n.d.	8,6	32	9	n.d.	n.d.
cis-Chlordane	9	3	n.d.	22	6	n.d.	n.d.	131	2	2
Trans-Chlordane	11	5	15,4	56	39	21	n.d.	n.d.	4	3
Trans-Nanochlor	341	8	27	33	5	115	17	50	2	3
Mirex	23	11	54	66	1	n.d.	32	n.d.	14	14
OCS	60	43	n.d.	n.d.	8	16	1	22	n.d.	n.d.
1- Ó HCHs	131	13	84	78,6	11	3,9	7	2	4	4
2- Ó PCBs, 6 Congeners	325	169	487	652	384	166,9	914,3	228	102	90
3- Ó DDT	1479	371	1242	4162	2050	375,4	1294	149	300	391
4- Ó Toxaphene, 3 Congeners	66	21	168	114	29	31	156	35	25	12
5- Ó Chlordane	361	16	42,4	111	50	144,6	49	190	8	8
Ó 1-5	2362	590	2023	5126	2524	721,8	2420	605	439	505

2.3.6 Summary of Future Production, Use and Releases of POPs- requirements for exemptions

Because of Turkey's Candidature Process, future releases (production) of POPs will be started to decrease after 2005. Most of the regulations has been renewed and/or changed and a lot of new regulations are also produced in this process. For example, MoEF has builded capacity by two projects together with government of Nederlands to increase knowledge and experience of relevant organizations and in addition to this, pilot studies about best available technics has done to apply IPPC directive in Turkey. To do this, some changes completed about adapting Turkish legislation to EU competence. As an example, using of best available technics on reducing air emissions included in environmental legislation. However, as a result of special conditions in Turkey, a long transitional period will be needed to validate the competence. For instance, as IPPC directive needs usage of BAT and BEP, in order to control and reduce the POPs it appears that knowledge about BAT and BEPs must be increased and studies to start the usage is necessary. Emissions as a result of involuntary production of POPs're given in Table 57.

On the other hand, none of the Annex A and B POPs chemicals will be produced and used in Turkey, therefore no exemptions will be filed at the Convention.

Table 57. Future release of POPs chemicals

Year		2002/03 Baseline Inventory	2005	2010	2020	2030
Releases from Unintentional Production		g I-TEQ	g I-TEQ	g I-TEQ	g I-TEQ	g I-TEQ
Pesticides	Production	0				
	Use	0				
PCB-HCB	Production	0				
	Use	10	9	7,2	5,8	4,6
PCDD/Fs		407,9	367	293,6	234,9	188

2.3.7 Existing Programmes For Monitoring Releases And Environmental And Human Health Impacts, Including Findings

POP's are organic chemical compounds that are highly toxic, persist in the environment, bio-accumulate in fatty tissues of living organisms, travel long distances, toward colder climates.

The twelve POPs designated as targets for early global action are all chlorine-containing organic compounds. They are aldrin and dieldrin, endrin, chlordane, DDT, heptachlor, mirex, toxaphene, hexachlorobenzene, polychlorinated biphenyls (PCBs), polychlorinated dibenzodioxins, and polychlorinated dibenzofurans.

POPs residues have been found in the fat of fish and animals, as well as in human breast milk, on a global scale. Some of the highest levels have been recorded in the arctic areas of both hemispheres.

Reproductive failures, deformities, malfunctions in fish and wildlife are linked by a growing body of evidence to these persistent pollutants.Often the true extent of the wildlife effects are subtle, and can be triggered at extraordinarily low concentrations.

Humans are generally exposed to POPs through their food supply. A growing body of scientific evidence associates human exposure to individual POPs with cancer, neurobehavioural impairment, immune system biochemical alterations and possibly disfunction, reproductive dysfunction, shortened period of lactation, and diabetes. The mechanism for many of these effects appears to be through disruption of the human endocrine system, often, during fetal development.

Pesticide usage in Turkey has started with the use of DDT basically against all kinds of pests in the 1950's. Turkey is a land of agriculture, therefore, agricultural pest control is compulsory and the most effective method for agricultural pest and malaria vector control is to use chemicals particularly DDT. A considerable number of synthetic organochlorine pesticides have been produced and offered for usage against pests since the 1940's. Among these, aldrin, DDT and heptachlor have been used until the 1980's, when their usage was prohibited. In Turkey, especially after 1980, primarily the items consumed by humans including fish, mussels and milk have been analysed for organochlorine insecticide residues and the results have either been published or reported .

Declaration and Reporting of Priority Pollutant Releases:

DDT was the most commonly used POPs chemical. Therefore it ranks first in the priority list. Aldrin, dieldrin and endrin together formed the second biggest group of POPs chemicals that have been analyzed.

Hexachlorobenzene is also one of the most widely used POPs pesticide in Turkey. We can say it takes the third position.

Current Monitoring Standards and Capacity for POPs:

There is no previously performed or currently ongoing monitoring study for POPs in Turkey. In Refik Saydam Hygiene Center, the laboratories of Poison Research Directorate are fully equipped and suitable for carrying out future monitoring for POPs. Already, drinking waters are being analyzed in these laboratories for PCBs on a routine basis. The only drawback is that the laboratory is not accredited as yet.

Since there are no monitoring studies, it is not possible to assess the weaknesses or to compare the practices with the obligations of the Convention.

Background on Potential Sources of POPs Impacts:

There are no current sources of POPs in Turkey besides approximately 2.700 tons of HCH and some electrical transformers with PCBs which are not in use.

Evidence of Presence of POPs in the Environment, Food, Feed and Humans: Literature survey as background material for the assessment a literature survey was used, performed for the candidate involved in the study, and covering the years 1977-2004. The survey provided 56 references, which were organised in a database Manager programme for an easy retrieving[10]. In addition the literature survey (1977-2004) give 89 publications. The analysis of the regional database (Table 58) showed that among the twelve POPs included in the Stockholm Convention. DDT, aldrin and HCB were those accumulating to a higher number of references.

Table 58 Literature survey (1977-2004)

Regions	Aldrin	Dieldrin	Endrin	Chlordane	Heptachlor	DDT	Toxaphene	Mirex	HCB	PCBs	PCDD/F
Marmara	2	1	1	1	0	2	1	0	2	2	2
Aegean	2	1	1	0	1	4	0	0	2	0	0
Blacksea	3	3	3	2	2	5	1	0	2	2	0
Central Anatolia	3	3	1	0	4	10	0	0	5	3	0
Mediterran.	2	2	2	0	1	2	0	0	0	0	0
East and Southeastern Anatolia	0	0	0	0	0	1	0	0	1	1	0
Total	12	10	8	3	8	24	2	0	12	8	2

[10] See Ergin N., et al., 2004. The Report of the Health Task Team.

Environmental Levels Toxicological And Ecotoxicological Characterization

A considerable amount of data is available on the occurrence of POPs in Turkey although with a very uneven distribution in terms of compartmental, geographical and temporal coverages, as well as analytical quality, particularly for the older ones. The data reported here is not intended to be exhaustive, but comprehensive enough for providing information about current levels of POPs in the different matrices. Data basically refer to the last decade and where possible the temporal variability is also assessed.

Concentrations of POPs in Abiotic Compartments

Air and Precipitation

The atmospheric compartment is one of the less studied subjects in Turkey, probably due to the methodological difficulties. Data are basically restricted to organochlorinated compounds such as HCB, HCH and PCBs, except for the latter ones, which have been determined in a large number of regions, mostly in urban and agricultural areas, the other measurements are not really representative for a global assessment.

- Concentrations of heavy metals and organic contaminants in ash collected from the İzmit hazardous/clinical waste incinerator are as follows: In April 2000,samples of furnace bottom ash, and fly ash from economiser and electrostatic precipitator, were collected from the İzaydaş (İzmit Waste and Residue Treatment, Incineration and Recycling Co.Inc.) incinerator and conveyed to the Greenpeace research laboratories for analysis. Two of the samples (ESP and economiser ash) were forwarded to an accredited laboratory in the UK for determination of the concentrations of dioxins and furans.

Ash collected from the electrostatic precipitator (MI0065) yielded the results shown in Table 59 the polychlorinated biphenyls (PCBs) were identified in all of the ash samples analysed, including the bottom ash. In addition, chlorinated dioxins were identified in the two samples of fly ash, with higher levels in the ESP sample than in the economiser ash.

Table 60 The summary of results from the analyses of ash samples for organic contaminants. “Noidentified” indicates the number of the compounds isolated in each case which could be identified to match qualities greater than 90%.

Table 59 Summary of results from analyses of ash samples for organic contaminants

Sample	Description	No. Compound Isolated	No. Identified	No. Chlorinated	No. PCBs
M 10064	Bottom ash	60	32	3	2
M 10065	ESP ash	13	2	2	2
M 10067	Economiser ash	12	3	3	2

The presence of chlorinated contaminants in the ESP ash was further confirmed by the results of the dioxin analysis for this sample (0.28 ng I-TEQ/g,ppb).This value is not among the highest recorded, but nevertheless fall within the broad range reported from some other incinerators.

There is a recent published study carried out by Karademir et. al. from Kocaeli University, Faculty of Engineering Department of Engineering in collaboration with İzaydaş and University of Newcastle upon Thyne, Faculty of Environmental Engineering for the estimation of PCDD/F levels in an industrialized area in Turkey.

Table 60 The concentrations of PCDD/F in air, soil grass and milk

	Concentration range	Average
Air	23-563 fg TEQ/m^3	176 fg TEQ/ m^3
Soil	0.5-4.1 ng TEQ/kg	1.2 ng TEQ/ kg
Grass	0.3-5.0 ng TEQ/kg	1.8 ng TEQ/ kg
Milk	33-308 pg TEQ/kg	105 pg TEQ/ kg

fg : 1 x 10^{-15} gram
ng :1 x 10^{-9} gram
pg :1 x 10^{-12} gram

TEQ : International Toxicity Equivalencies.

The exposure routes taken into consideration in this study were inhalation and oral exposure via food consumption. For this, concentration in air and concentration in grass were used for food of vegetable origin. Similarly, figures measured for milk were also used in the study. For subterranean vegetables (onion, potatoes) and meat, poultry and eggs, estimated dioxin levels through interpolation were employed.

An exposure pattern was established for the inhabitants of the area.

According to the study, the exposure rates estimated for PCDD/F for urban habitants were 4 pg TEQ/body weight/day, and 10pgTEQ/body weight/day for rural population.
The accepted limit is 2 pg TEQ/body weight/day.

As a result, it can be seen that the estimated levels are very high for our country. However, as the scope of the study and the number of samples were not big enough, there is need for further studies to reach more precise results. Since the exposure source is mainly of food origin, more studies need to be performed on foodstuff.

Clean and Wastewaters

İstanbul, is a metropolis with almost twelve million inhabitants and is the largest urban settlement in Turkey. The average water demand for public and industrial use is around 18 million cubic meters per day. The water demand of the city is mainly supplied from surface water sources, which have been in use for a thousand years. The water sources of İstanbul have encountered serious pollution problems. Besides the new settlements and some industries, agricultural activities around the water sources include growing of cereal, corn and sunflower corps and raising of cattle and chickens. Consequently, the control of pesticide

application along with the fertilizing is important in the water entrapment areas. Although the use of some chlorinated pesticides has been prohibited in Turkey, their persistence against degradation leads to a potential risk for the water sources.

Several raw and potable water samples from the drinking water supplies of İstanbul were analyzed for the 9 organochlorine pesticides. Only α and β HCH and aldrin were dedected in GC and TLC analyses. Since they are persistent enough and degrade very slowly they easily accumulate in the soil. The pesticide concentration in the reservoir water is related to the partition coefficient at kinetic equilibria involving sorption and desorption processes (Table 61).

Table 61 Organochlorine pesticide contents and other properties of raw and treated waters of İstanbul

		Treatment plant			
	European side			*Anatolian side*	
Sampling	Kağıthane T.P.	B. Çekmece T.P.[b]	Ömerli Dam T.P.	Elmalı T.P.	
	LOCATION				
	Alibey Dam	Terkos Dam			
Raw Water					
α-HCH (ppb)	0.662 ± 0.060	0.908 ± 0.025	0.679 ± 0.036	0.335 ± 0.019	1.724 ± 0.025
y-HCH (ppb)	<0.001	nd	0.067 ± 0.004	0.077 ± 0.006	nd
Aldrin (ppb)	nd[d]	nd	nd	0.029 ± 0.004	nd vspace5pt
Clarifier outlets					
α-HCH (ppb)	0.586 ± 0.013	0.829 ± 0.008	0.516 ± 0.009	0.308 ± 0.008	0.934 ± 0.014
y-HCH (ppb)	<0.001	nd	0.062 ± 0.006	0.064 ± 0.006	nd
Aldrin (ppb)	nd	nd	nd	0.058 ± 0.004	nd
Filter outles[e]					
α-HCH (ppb)	0.886 ± 0.013	0.879 ± 0.007	0.769 ± 0.003	0.517 ± 0.005	0.620 ± 0.006
	(0.326 ±0.006)	(0.419 ± 0.004)	(0.255 ± 0.005)	(0.262±0.004)	(0.490 ± 0.006)
y-HCH (ppb)	<0.001	nd	0.057 ± 0.003	0.018 ± 0.002	nd
	(nd)	(nd)	(0.005 ± 0.001)	(0.002±0.001)	(nd)
Aldrin (ppb)	nd	nd	nd	0.081 ± 0.009	nd
	(nd)	(nd)	(nd)	(nd)	(nd)
Pumping stations[e,f]					
α-HCH (ppb)	0.145 ± 0.005	0.544 ± 0.004	0.158 ± 0.004	0.423 ± 0.012	0.142 ± 0.003
	(0.062 ± 0.009)	(0.151 ± 0.010)	(0.070 ± 0.008)	(0.158±0.015)	(0.103 ± 0.007)
y-HCH (ppb)	<0.001	nd	0.033 ± 0.002	0.018 ± 0.003	nd
	(nd)	(nd)	(0.004 ± 0.001)	(0.002±0.001)	(nd)
Aldrin (ppb)	nd	nd	nd	0.071 ± 0.004	nd
	(nd)	(nd)	(nd)	(nd)	(nd)

[a]Average of five data sets of α, y-HCH and Aldrin (95 % confidence)
[b]Chlorinity dependent corrected values.
[c]NTU : Nephelometric turbidity unit. Formazin suspansions were used to prepare calibration curves.
[d] nd : not detected
[e] Outlets from regular back- washing are in parenthesis.
[f] Mixed water samples from filter sets.

Water samples from the distribution area were also analyzed and only α-HCH residues were found in the tap waters of several districts. Results are given in Table 62.

Table 62 Organochlorine pesticide contents of tap water in several districts of İstanbul

Treatment Plant	District	Approx.distance From treatment plant (km)	α-HCH[a] (ppb)
European side			
A.Kağıthane T.P.	Treatment outlet	0	0.145 ± 0.005 and 0.544 ± 0.004
	Mecidiyeköy	6.5	0.699 ± 0.100
	Beşiktaş	8.5	0.191 ± 0.046
	Maçka	8.8	0.041 ± 0.025
	Beyoğlu	9.3	0.143 ± 0.017
	Esenler	13.5[0]	0.143 ± 0.017
B.Büyükçekmece	Treatment outlet	0	0.158 ± 0.004[b]
	Bahçelievler	30.0	0.090 ± 0.016[b]
	Zeytinburnu	36.0	0.089 ± 0.011[b]
Anatolian side			
A.Ömerli T.P.	Treatment outlet	0	0.423 ± 0.012
	Göztepe	27.0	0.228 ± 0.011
	Kartal	29.0	0.062 ± 0.017
	Maltepe	31.0	0.560 ± 0.012
	Suadiye	33.1	0.627 ± 0.018
	Üsküdar	35.0	0.034 ± 0.021
	Kadıköy	35.1	0.281 ± 0.024
	İncirli	48.8[c]	0.328 ± 0.003
	Bakırköy	50.8[c]	0.126 ± 0.013
	Ataköy (3 rd Div.)	51.0[c]	0.097 ± 0.004
B.Elmalı T.P.	Treatment outlet	0	0.142 ± 0.003
	Beykoz	17.0	0.163 ± 0.005

[a] Any other organochlorine pesticides were not detected.
[b] Corrected values.
[c] Relatively new lines.

The elimination of γ-HCH and aldrin which are more toxic than α-HCH possibly occurred on the inner walls of the distribution lines and ın the intermediate storage tanks via adsorption and sedimentation processes.

The residue levels in drinking water of İstanbul were found to be under the maximum permissible levels of 1 ppb for aldrin and 4 ppb for γ-HCH. The residue levels are also in conformity with the Turkish regulations in which water qualification is made on the basis of the total pesticide residue, permitting a maximum 1 ppb total concentration in high quality water. Regarding the Turkish regulations and WHO standarts, organochlorine pesticide concentrations in all water samples are under the limits. However, tap waters flowing through older lines have higher concentrations of organochlorines than EC standarts for single compounds.

- Petroleum hydrocarbon pollution of surface soil and groundwater caused by production activities in Beykan Oil Field is of concern. The Beykan Oil Field is enclosed by the watershed of a medium size dam constructed during early-sixties for irrigation purposes. A total of 38 oil producing wells are placed within the various protection zones surrounding the dam's reservoir; 13 of them being in the immediate vicinity, within the first 300m of the reservoir shore called the ''absolute protection zone''. Oil spills at these wells and along pipelines connecting wells and other facilities are considered as potential pollution sources effecting the reservoir water quality. Existing spill records revealed that, during the peak oil production years, an annual average spill volume of 95 tons for the entire field, resulting in an average TPH concentration of 20.300 ppm in contaminated soils (NATO report,1998)[11].

- HCH and alpha, beta, gamma and delta isomers of HCH were determinated 16 samples of surface and ground water in the Middle Black Sea Region. The residue of HCH and isomers were found 6 samples. Residue value was 0.0003-0.2505 ug/l in surface water, and 0.0001-0.5720ug/I in ground water in different isomers (Geyikçi and Büyükgüngör, 2002)[11]. Therefore, it is not possible to assess the environmental significance of the reported values.

- Manyas Lake is contaminated by different types of pesticides. Organochlorine (OC) pesticides were detected in sediment and water samples taken from 9 different stations in Manyas Lake-Balikesir (known as the "bird paradise") and its basin during November 1996 and May 1997. According to the results of residue analysis, ecosystems were found to be contaminated by OC pesticide residues. The residues consisted mainly of heptachlor, heptachlor epoxide, HCH, aldrin, op'DDT, op'DDE, endrin, and dieldrin. Contamination level of the water is above the threshold toxic level for the aquatic fauna and flora, when compared to Turkish regulations (Kolankaya et al., 1997)[11]. The contamination level was higher in the lake than in the surrounding freshwaters (Table 63).

These pesticides were not found in toxic levels in water samples, but heptachlor and heptachlor epoxide in sediments may be toxic for waterbirds and for organisms living in the deep. Manyas Lake is contaminated by different types of pesticides These pesticides obviously affect waterbirds too. The results include a decrease in the egg production and hatching success, an increase in hatchling mortality and malformations in hatchlings.

- Five different OC pesticides and their degradation products were detected in sediment, water and fish in the upper Sakarya basin (Barlas, 1998).[12] (Table 64)

[11] Geyikçi., Büyükgüngör H., 2002 The Research of Pollution Spring Nad Surface Waters caused by Benzene Hexachlor Isomers and Benzen Hexachlorid, Pesticides, Scientific of Environment, vol.5, 30-46.
NATO 1998 Pilot Study, Annual Report No. 228.
Kolankaya D., et al 1997 The Pollution of Manyas Lake, Toxicologist, March 36, 279.

[12]Barlas N. 1998 Determination of Organo chlorine Pesticide in Residue in Aquatic Systems and Organisms in Upper Sakarya Basin, Turkey, Bull, Env. Contam. Toxicol. 62, 278-285.

Table 63 Some Organochlorine residues in sediment samples of Manyas Bird Lake, May, 1996-1997

Pecticides (ppb)	Sığırcık Creek	Entrance of Sığırcık	Karadere	Kocaçay	Entrance of Kocaçay	Dutluk Creek	Bereketli
α-HCH	0.448	1.186	0.814	1.421	0.959	1.752	0.394
β-HCH	0.226	2.024	1.548	1.337	0.935	1.784	1.780
Lindane	0	0.942	0.175	2.078	0	0.472	0.542
Heptaclor	5.463	3.403	3.460	8.442	0.101	9.100	5.827
Heptaclorepoxide	8.332	10.306	9.530	15.230	1.130	13.315	12.808
Aldrin	0	2.400	1.092	1.229	1.154	0.713	0.915
Dieldrin	0.156	0.630	0.378	1.572	0.208	0.620	1.152
Endrin	0.225	0.061	0.414	3.402	0.304	0.163	0.260
pp'DDD	0.169	0.448	0.385	0.439	0.025	0.371	0.310
pp'DDE	0.050	0.284	0.345	1.245	0.045	0.157	0.015
op'DDD	0.266	0.231	0.039	1.199	0.108	0.184	0.024
op'DDT	0.186	0.034	0.177	0	0.089	0	0.915
pp'DDT	0.228	0.489	0.288	0.350	4.546	0.292	0.282

Table 64 Seasonal organochlorine residues (µg /gr wet weight) in water samples from upper Sakarya river basin, between October 1995 to September 1996.

Pecticides	October 1995 mean n: n:8	February 1996 mean n: 8	May. 1996 mean n:8	August 1996 mean n: 8
α-HCH	0.226	0.158	1.878	1.877
β-HCH	0.298	ND	ND	ND
Lindane	0.183	ND	ND	ND
Aldrin	0.239	ND	0.093	ND
Dieldrin	1.346	ND	0.045	0.117
Endrin	2.738	0.092	0.162	0.063
Heptaclor	2.555	ND	0.325	ND
Heptaclorepoxide	0.441	ND	0.112	ND
op'DDT	1.013	0.068	0.096	0.001
pp'DDT	1.879	0.069	0.175	0.086
op'DDD	1.765	0.093	0.168	ND
pp'DDD	1.676	0.071	0.04	0.042
pp'DDE	0.825	ND	0.382	1.117

ND : Not detectable
n: number of samples

- Water, sampled at different localities in Sarıyar Dam Lake (SDL) were analysed for the determination of OCP levels. OCP concentrations in water and sediment of running water systems and lake environment. 11 different pesticides and their residues were detected in water samples from selected stations of Sarıyar Dam Lake (ranging from 0.011 ppm

pp'DDT in Sarıyar Station and 0.069 ppm pp'DDT in Çayırhan station) (Ekmekçi et al., 2000)[13].

OCP residues identified (with respect to types) and measured (with respect to amount) in Aladağ Creek were the lowest (only alpha- HCH: 0.048 ppm) among the stations studied, where the highest levels were detected in Uşakbükü Station (10 different OCP residues, with a maximum of 0.061 ppm alpha-HCH). The findings of the water analyses revealed that OCPs were transported to SDL mainly by Sakarya River and Kirmir Creek. In addition, it can be said that pollution load of Aladağ Creek with respect to OCP were much lower than that of the other two rivers flowing into SDL (Table 64).

The OCP residues and levels determined in the sediment samples taken from all seven sampling stations are together with the results obtained for water samples in a comparative form. OCP residues in sediments are much higher than waters of SDL with respect to both variety and concentration. The level of residues in the sediments, is even higher than the levels observed in fish species. The highest amount of OCP residues in sediments, among seven stations, were determined in Uşakbükü station (11 different types of OCP residue; maximum concentration 0.708 ppm) and, as in the case of water, levels observed in Aladağ Creek were the lowest.

- Another analysis was carried out in samples of water and sediment in Göksu Delta. As a result of the study, 13 OC pesticides and their residues were detected in water samples of Göksu Delta (residues ranging from 0.007 ppm lindane to 1.377 ppm heptachlor). Data shown in Table 65. (Ayaş, Barlas, and Kolankaya, 1997)[14].

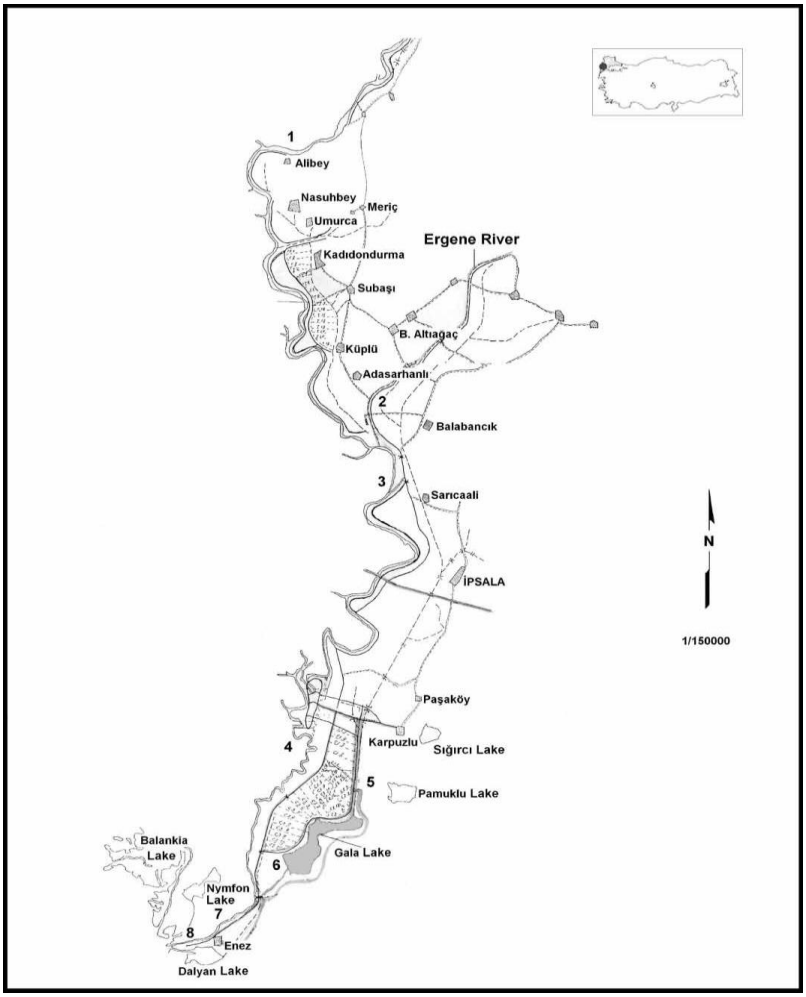
Table 65 Residue levels of organochlorine pesticides in water and sediment from Göksu Delta

Pesticides	Water Mean ppm N: 24	Sediment Mean ppm N: 24
α-HCH	0.058	0.687
β-HCH	0.006	0.63
Lindane	0.007	0.164
Aldrin	0.049	0.690
Dieldrin	0.036	0.044
Endrin	0.021	0.033
Heptaclor	0.015	1.377
Heptaclorepoxide	0.019	0.244
op'DDT	0.050	0.041
pp'DDT	0.024	0.553
op'DDD	0.046	0.220
pp'DDD	0.057	0.195
pp'DDE	0.025	0.579

[13] Ekmekçi F.G., et al 2000, Organo chlorine Pesticides and their residues in Water, Sediment and Some Fish Species of Sarıyar Dam and Tributaries,Turkey, TUBITAK.

[14] Ayas et al 1997, Determination of Organochlorine Pesticide Residues in Various Environments and Organisms in Göksu Delta, Turkey, Aquatic Toxicology 39, 171-181.

OCP residue analysis on water and sediments in Uluabat lake varies between 2,4 ng to 1004,8 ng. On four stations 1004,8 ng of Heptachlor epoxide g-1 and two stations 292,8 ng's of Endirin are highest values for sediments. On the other hand, p.p - DDE and p.p-DDT were measured on all stations and the average values in order are : 48,6 , 604,2 ng. g-1 and 79,4 to 886,8 ng. g-1. As to stations, extractable HCB, α-,β-,γ- BHC in sediments are measured average 425.6 , 568.2 , 377.6 , 266.6 ng g-1 . In water samples , α-,β-,γ- BHC derivativs and p.p -DDE, p.p DDT, HCB, Aldrin and Eldrin are measured at very low concentrations. (Barlas, N. Çok, I. Akbulut N., 2006) [15]



Picture 4

Organochlorine pesticide residues of the more commonly used compounds were detected in natural fresh water bodies in Central Anatolia. A total of 13 organochlorine pesticides and their residues have been determined in water and sediment in Tuz Lake Hirfanlı Dam Lake, Eşmekaya Lake, Tersakan Lake and Bolluk Lake. In the Table 76 OC pesticide residues in sediment sample were generally higher than residue levels in water samples. Alpha HCH, beta HCH, heptachlor epoxide, aldrin, op'DDT, op'DDD, pp'DDT were detected in high levels in sediment samples. In Tuz Lake, Hirfanlı Dam Lake, Eşmekaya lake, Tersakan Lake, and OC pesticide residues (especially alpha HCH, beta HCH, aldrin, dieldrin, heptachlor epoxide and DDT metabolites op'DDT , pp'DDT, pp'DDD) in water and sediment samples

[15] (Barlas, N. Çok, I. Akbulut The contamination levels of organochlorine pesticides in water and sediment samples in Uluabat Lake, Turkey . Evironmental Monitoring and Assessment .118:383-391,2006).

were generally higher than in other lakes, because they are located in wide agricultural areas (Picture 4, Table 67).

The highest amount of extractable alpha HCH was 1,38 µg/g (range ND – 2,719 µg/g mean) which was found in the sediment sample of Bolluk Lake. The highest residue levels of heptachlor epoxide was 1,398 µg/g which was found in sediment samples of Kozanlı Lake. Also the highest average amount of extractable beta HCH (2,328 µg/g mean of Hirfanlı Dam Lake) were detected in sediment samples. DDT and its metabolites pp'DDE, op'DDD, op'DDT, pp'DDD, pp'DDT (mean concentrations 1,421, 1,389, 2,244, 0,969 µg/g in Tuz Lake, Hirfanlı Dam Lake, Tuz Lake Tuz Lake respectively) were detected at high levels in sediment samples. This high residue levels of pesticides may be due to continuous usage of OC pesticides (Barlas, 2002).

Table 67 Residue levels of organochlorine pesticides (µg/g) in water and sediment samples, collected from Central Anatolia in Turkey, during 1999-2000

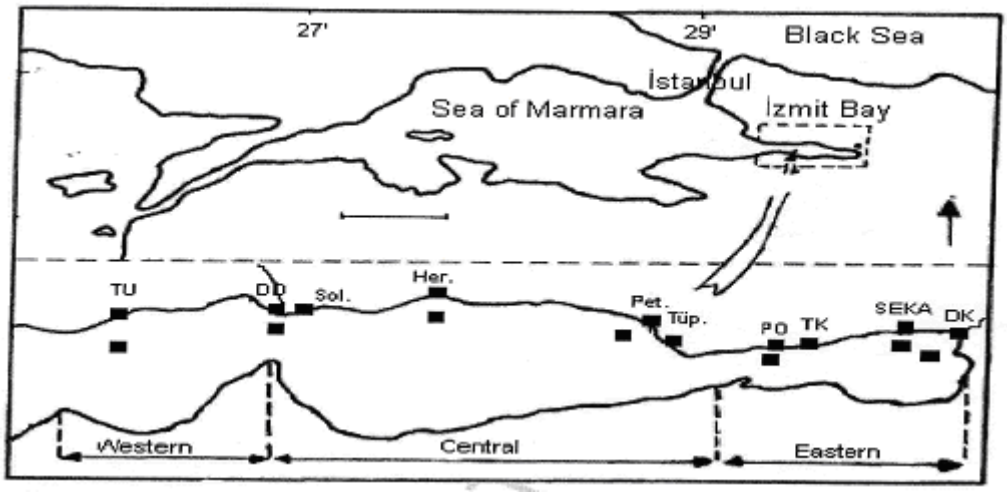
Organochlorine compounds	Tuz Lake		Hirfanlı Dam Lake		Eşmekaya Lake		Tersakan Lake		Bolluk Lake	
	Water (Min- Max) n:10	Sediment (Min-Max) n:10	Water (Min-Max) n:10	Sediment (Min-Max) n:10	Water (Min-Max) n:10	Sediment (Min-Max) n:10	Water (Min-Max) n:10	Sediment (Min-Max) n:10	Water (Min-Max) n:10	Sediment (Min-Max) n:10
α-HCH	ND-1.069 0.525	ND-1.519 0.797	ND	ND	ND-1.036 0.345	0.652-2.13 1.246	ND	0.04-1.857	ND-0.785 0.246	ND-2.719 1.386
β-HCH	ND	ND-3.04 1.674	ND	ND-3.23 2.328	ND-0,688 0.229	0.397-3.97 1.678	ND	0.91-2.44 1.476	ND	1.148-3.87 1.958
Lindane	ND-0.163 0.02	ND-3.84 1.79	ND	ND	ND	2.311-3.156 2.586	ND	1.52-2.68 1.672	ND	ND
Aldrin	ND	ND-2.324 0.524	ND-0.148 0.123	ND-2.42 2.218	ND	0.765-4.426 2.298	ND	ND	ND	ND-1.589 1.459
Dieldrin	ND-1.17 0.562	ND-1.329 0.710	ND	ND	0.037-0.746 0.398	ND	ND-0.47 0.36	ND	ND-0.027 0.11	ND
Endrin	ND-0.403 0.188	ND-1.46 0.640	ND	ND-0.373 0.05	ND	0.203-0.662 0.451	ND	ND-0.559 0.366	ND	ND
Heptaclor	ND	ND	ND	ND	ND	ND-0.49 0.215	ND	0.94-1.25 1.031	ND	ND
Heptachlorepoxide	ND-0.273 0.25	ND-1.677 1.144	ND	ND-2.55 1.385	ND	0.362-0.993 0.617	ND	0.27-1.423 0.961	ND	ND-1.171 0.95
op'DDT	ND	1.01-3.54 2.244	ND	ND	ND-0.415 0.284	ND-0.554 0.251	ND	ND	ND-0.312 0.026	ND
pp'DDT	0.181-1.955 0.831	0.042-2.93 1.307	ND-0.224 0.098	ND-0.375 0.254	0.148-1.184 0.633	0.147-1.224 0.55	ND-0.425 0.226	ND-0.385 0.37	ND-0.198 0.08	ND-0.616 0.384
Op'DDD	ND-2.12 1.236	ND-1.798 0.527	ND-1.446 0.793	0.088-3.99 1.389	0.213-0.47 0.391	ND	ND-0.487 0.193	ND	ND	ND-0.06 0.007
Pp'DDD	0.301-1.169 0.682	0.153-2.66 0.969	ND-0.311 0.132	ND-0.567 0.296	ND-311 0.273	ND-0741 0.47	ND-0.402 0.29	ND-0.294 0.152	ND	ND-0.542 0.36
Pp'DDE	ND-0.429 0.283	ND-2.309 1.421	ND-0.784 0.212	ND-1.443 0.667	0.128-1.115 0.881	0.006-0.278 0.11	ND-0.35 0.265	ND	ND	ND

ND: Not Detectable
n: Number of Samples

Seawater

Most of the first data published 25 years ago on organic pollutants in sea water lied below the analytical sensitivity of the method used, so the significance of the data sets is limited. More recently, the use of large water volume sampling devices has provided accurate data on levels and budgets of POP's in the marine environment.

The toxic compoud of pollutant were detected throughout Izmit bay as shown in Map 2.



Map 2. Sea of Marmara sampling stations in the Izmit bay

PCB105 from PCBs were detected at all the stations. PCBs were classified and represented as non-ortho PCBs, mono-ortho PCBs and total PCBs in Table 68. The concentration of total PCBs in sea water range from 2.32 to 26.33 ng/l. In general, non-ortho PCB concentration were between below the detection limit and 118.66 pg/l in İzmit Bay sea water. The concentration of mono-ortho PCB were much higher than the non-ortho. The total PCB concentrations were much higher at Dil Deresi than at the other stations (Telli, 1991)[16]

PCBs are artificial pollutants and total PCB concentrations in sea water are1000 times lower than in mussel samples. Many high total PAH and PCB concentrations were found at the pulp and paper factory sites. The highest pollution occurred in Doğu Kanalı and Dil Deresi where were the main rivers containing wastes flow into the İzmit Bay.

The concentration of organochlorine pesticide residues in the Eastern Aegean Sea waters were detected. Sample location is shown in Map 3. (Küçüksezgin et al, 2001)[17].

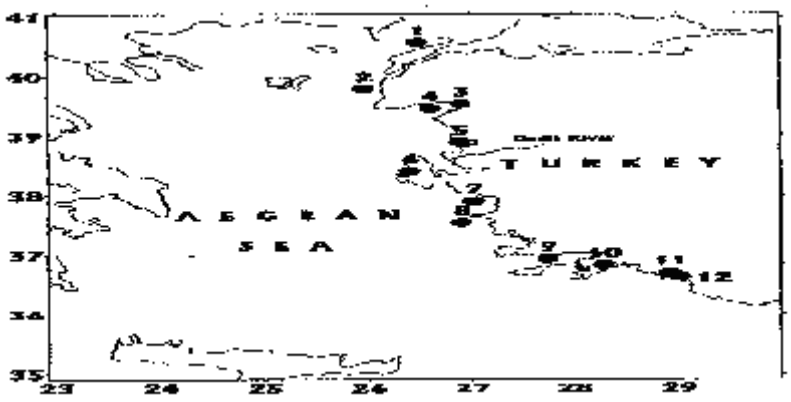
[16] Telli F., 1991 Seasonal Changes in the Polyaromatic Hydrocarbone (PAH) and Organochlorine Pesticide Levels in Mussels / Mytilus galloprovinciallis, Living Along the Black Sea (M.Sc Thesis) METU Dept. Mar. Biology and Fisheries Institute of Marine Sciences, 114 pp.

[17] Küçüksezgin et al 2001. Trace Metal and Organochlorine Residue Levels in Red Mullet (*Mullus barbatus*) from the Eastern Agean. Turkey, Wat. Res. Vol.35, No.9, 2327-2332.

Table 68 The congeners of PCBs concentrations in coastal water of İzmit Bay (pg/l)

Compounds (ng / l)	No. of ring	TÜBİTAK ± SE	Dil Deresi ± SE	Solventaş ± SE	Hereke ± SE	Petkim ± SE	Tüpraş ± SE	Petrol Ofisi ± SE	SEKA ± SE	Doğu Kanalı ± SE	D.L.
Naphthalene	2	n.d	3.90	n.d	n.d	n.d	2.53 ± 0.9	n.d	n.d	0.14 ± 0.01	0.1
Acenaphthylene	3	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.55
Acenaphthene	3	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.29 ± 0.03	0.03
Fluorene	3	n.d	n.d	n.d	n.d	0.59 ± 0.03	n.d	0.16 ± 0.02	0.82 ± 0.03	1.90 ± 0.02	0.03
Phenanthrene	3	0.28 ± 0.05	0.47 ± 0.04	0.19 ± 0.10	1.09 ± 0.10	2.47 ± 0.9	n.d	n.d	1.31 ± 0.02	1.17 ± 0.03	0.01
Anthracene	3	n.d	n.d	n.d	n.d	0.09 ± 0.01	0.04 ± 0.01	n.d	n.d	0.32 ± 0.01	0.004
Fluoranthene	4	n.d	n.d	0.37 ± 0.05	n.d	n.d	n.d	n.d	0.74 ± 0.02	1.26 ± 0.06	0.08
Pyrene	4	n.d	1.38 ± 0.06	n.d	n.d	0.80 ± 0.02	0.92 ± 0.05	n.d	2.64 ± 0.1	n.d	0.02
Benz[*a*]anthracene	4	n.d	0.89 ± 0.01	0.29 ± 0.03	n.d	1.57 ± 0.03	2.28 ± 0.3	n.d	0.48 ± 0.02	0.35 ± 0.04	0.02
Chrysene	4	n.d	0.68 ± 0.02	0.37 ± 0.02	0.82 ± 0.02	0.29 ± 0.03	1.14 ± 0.2	n.d	1.17 ± 0.3	1.07 ± 0.07	0.01
Benzo[*e*]pyrene	5	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.09
Benzo[*b*]fluoranthene	5	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.02
Benzo[*k*]fluoranthene	5	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.18 ± 0.01	0.005
Benzo[*a*]pyrene	5	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.72 ± 0.01	0.007
Dibenz[*a,h*]anthracene	5	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.01
Benzo[*g,h,i*]perylene	6	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.02
Indeno[1,2,3-*cd*]pyrene	6	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	n.d	0.15
Total HPLC (*ng/l*)		0.28 ± 0.05	7.32 ± 0.08	1.22 ± 0.06	1.91 ± 0.1	5.81 ± 0.90	6.91 ± 0.97	0.16 ± 0.02	7.16 ± 0.32	7.40 ± 0.11	
Total Spectro (µg/l)		2.5 ± 1.0	18.5 ± 3.0	1.16 ± 0.6	2.93 ± 0.5	2.75 ± 0.3	3.69 ± 1.0	3.12 ± 1.1	1.81 ± 0.9	13.68 ± 3.5	

n.d. Below the detection limits;
D.L., Detection Limitsfor the HPLC measurements;
SE, Standard Error.



Map 3 Location of stations in the Aegean Sea

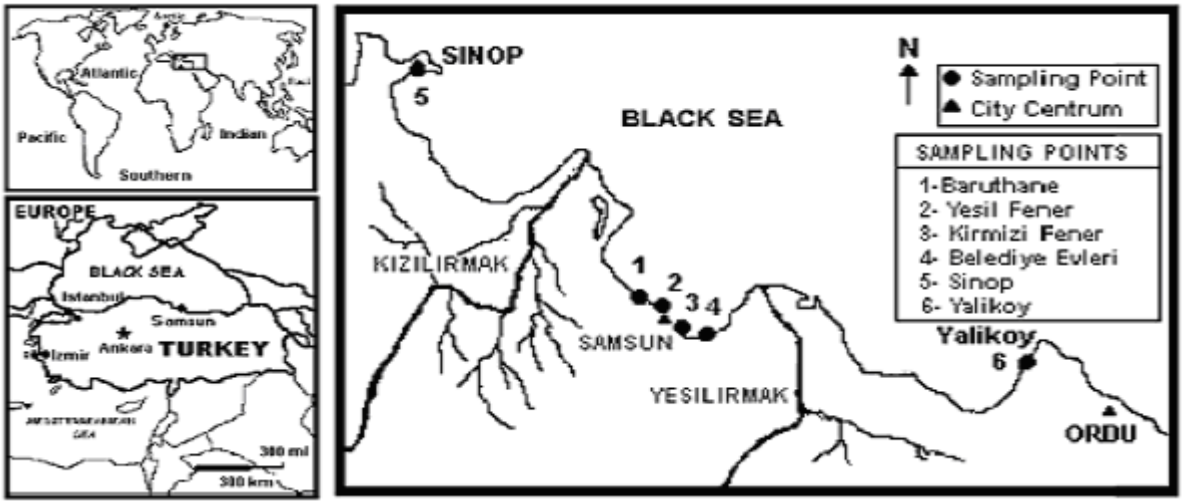
Concentrations of DDE and DDD range between 10-18 and 0.86 - 4.5 ug/Kg (Wet wt) respectively in *Mullus baratus* in Aegean Sea. The level of aldrin varied between 0.10 and 0.61ug/Kg in samples in Aegean Sea. The composition of DDT and its metabolites were generally in the order of p,p'-DDD (34%),p,p'DDT (16%) and o,p'-DDT (4%) Table 69.

Table 69 Organochlorine residues in Aegean Sea. Concentrations are expressed in ug/Kg wet weight.

	Aldrin	P,p'-DDE	P,p'DDD
No. of sample	18	18	18
Min.	0.10	0.86	10
Max.	0.61	4.5	18
Mean	0.26 ± 0.14	1.94 ± 0.97	14.44 ± 2.48

PCB was not detected in this study. But in the Eastern Mediterranean Sea, evaporation also exceeds precipitation and co-distillation of PCBs also take place in the Agean Sea.

- Kurt and Özkoç (2004) determined levels of OC pesticides and PCBs in seawater from the Mid-Black Sea Coast of Turkey. Sea water monitoring survey was conducted at six sampling points between Yaliköy (Ordu) and Sinop in 1999-2000 along the Mid-Black Sea Coast (Map 4). Many chlorinated pesticides were measured in seawater. The concentrations of p,p' DDE and p,p' DDD were higher than DDT. This result is not very surprising and it also suggests the bioaccumulation of DDT in the organism. There were differences in sampling points which are shown in Table 79. PCBs were determined in the seawater samples and PCB pollution was not observed in any of the sampling points. None of the samples were show the effects of the agriculture in the Kızılırmak and Yeşilırmak areas (Table 70).



Map 4. Study and location of sampling points.

The persistent half life of DDT in aquatic environment has been suggested to be approximately 5 years and 10-20 years (estimated from studies) on bivalves. DDT can be transformed to DDE and DDD slowly in this process. Considering the prohibition of use of DDT in Turkey to be in the late 1980's, it is not surprising to find very high concentrations of DDT in biota samples. On the other hand, it is thought that there is still continuous input of this compound into marine environment from atmospheric deposition of DDT and DDT probably leaches from highly DDT contaminated areas and agricultural soils as well as illegal

usage in the region and other countries. Additionally, there may be input from illegal usage of these compounds in the region. DDE, which is the most often recognized metabolite of DDT is a very slowly degradable compound.

Table 70 Average concentration of chlorinated pesticides and PCBs in seawater from the Mid – Black Sea Coast of Turkey in 1999 and 2000.

	SİNOP	KIZILIRMAK	SAMSUN	YEŞİLIRMAK	NEAR ORDU	
Compound	Baruthane (1),	Yeşil Fener (2),	Kirmizi Fener (3),	Belediye Evleri (4),	Sinop (5),	Yalikoy (6),
	Pg/ml	Pg/ml	Pg/ml	Pg/ml	Pg/ml	Pg/ml
a-HCH	0,6	Nd	1	Nd	Nd	Nd
b-HCH	7	nd	nd	nd	nd	Nd
g-HCH	Nd	0,3	Nd	Nd	Nd	Nd
d-HCH	3	Nd	Nd	Nd	Nd	Nd
P,p'-DDT	nd	nd	nd	Nd	nd	Nd
P,p'-DDE	nd	nd	nd	Nd	1	Nd
P,p'-DDD	nd	nd	nd	Nd	105	Nd
Endosulfan-I	nd	0,1	1	15	nd	Nd
Endosulfan sulphate	nd	nd	nd	Nd	nd	Nd
Endrin	nd	nd	nd	Nd	nd	Nd
Endrin aldehit	nd	0,5	nd	Nd	15	Nd
Heptachlor	0,7	0,2	30	1	1	1
Heptachlor epoksit	nd	nd	nd	Nd	nd	Nd
HCB	nd	nd	8	2	nd	Nd
Lindane	nd	nd	nd	Nd	nd	Nd
Aldrin	nd	nd	nd	Nd	nd	Nd
Endosulfan-II	6	nd	nd	2	nd	Nd
PCB'ler	nd	nd	nd	Nd	nd	Nd

Yeşil Fener (2) and Kirmizi Fener (3) sampling points are in harbour along Samsun Coast, Baruthane (1) is on west part of Samsun Coast and Belediye Evleri (4) is on east part of Samsun Coast
nd: Not detected [a] Bolded numbers are below detection limit.

Soils and sewage sludges

Soil contamination by PCB oil leaking from storage drums at a military reutilization yard occurred during the operation of the reutilization yard between the years of 1970 and 1988 in Incirlik/Adana. An excavation of 0.5 meters deep was made in October 1991, leaving the excavated soil stored in approximately 300 drums and in a pile. Estimated PCB-contaminated soil volume was 1.600m^3 . Site characterisation investigations revealed that site soils are high in clay content (65%) and potential for groundwater contamination is low. PCBs concentrations measured in composite contaminated soil samples range up to 750 ppm. For remediation of contaminated soils, various alternatives are being evaluated including incineration and *in situ/ex situ* solidification/stabilization (S/S).

The analyses were carried out in samples of various soil from different parts in Göksu Delta. As a result of the study, 13 OC pesticides and their residues were detected in various parts of Göksu Delta (residues ranging from 0.013 ppm lindane in non-agricultural soils to 5.416 ppm pp'DDE in agricultural soils). OC concentrations in soil samples from agricultural areas were generally higher than in water and sediment (Table 80). α-HCH, aldrin, heptachlor, op'-DDT, op'-DDD, and pp'-DDE were detected at high levels in soil samples (Ayaş, Barlas, and Kolankaya, 1997).

Concentrations of POPs in Biota Freshwater environment: fish and aquatic birds

In fish samples, DDT and its metabolites pp'DDE, op'DDT, pp'DDT, pp'DDD, and op'DDD (mean concentrations ranging from 2.454, 1.74, 1.474, 1.262 and 1.199 μg/g, respectively) were detected at high levels in October. Heptachlor epoxide, which is the degradation product, was found in greater concentrations in adipose tissue during the same month (mean concentration 3.635 μg/g). The bioconcentration factors of these pesticides have also been estimated. In the study, all OC pesticide residues were detected at higher degrees at stations, which are exposed to various pollutants including effluent discharge from factories, agricultural and industrial wastes. Dieldrin levels were higher than aldrin, and heptachlor epoxide levels were higher than heptachlor (Barlas, 1998).

In fish, the OCP concentrations were detected at varying amounts in different species and tissues. There was a difference in the OCP concentrations in carp and grey mullet. In carp, 6 different OCP residues in liver and 13 different OCP residues in adipose tissue were detected mean concentrations ranging from 1.072 ppm endrin to 4.217 ppm op'DDT. In grey mullet, however, 6 different OCP residues in liver and 11 different OCP residues in adipose tissue were detected mean concentrations ranging from 0.066 ppm pp'-DDE to 0.912 ppm op'DDT. Aldrin was found in greater concentrations than dieldrin in blue crab, carp and grey mullet adipose tissues. Also, heptachlor was found in greater concentrations than heptachlor epoxide in carp adipose tissue and grey mullet liver. OCP accumulation in carp was higher than in grey mullet. Chosen species of waterbirds and their eggs were contaminated by OC pesticide residues. OCP concentrations varied among bird species and their eggs. OCP concentrations were higher in adipose tissue than in the liver of waterbirds. In coots, 4, 13 and 9 different OCP residues were detected in liver, adipose tissue and eggs respectively mean concentrations ranging from 0.075 ppm op'-DDT in eggs to 2.147 ppm β-HCH in adipose tissues. In mallards, 5, 12 and 5 different OCP residues were detected in liver, adipose tissue and eggs, respectively mean concentrations ranging from 0.046 ppm pp'-DDE in adipose tissue to 2.775 ppm β-HCH in adipose tissues. 13 different OCP residues were detected in little egret eggs mean concentrations ranging from 0.045 ppm endrin to 1.789 pp'-DDE in little egrets (Ayaş, Barlas, and Kolankaya, 1997).

In three stations along Büyük Menderes river basin, 25 Carp (*Cyprinus carpio*) fish sampling was done (shown in Map 5) .[18]

[17]Hilmi Orhan, Rasih Kocagoz, Melis Karaca, Fatih Percin, Okan Ozaydin. Monitoring of industrial and agricultural pollution by antioxidant enzyme activities and protein oxidation in carp along the river Büyük Menderes: Preliminary implications. Toxicology Letters 2010; 196S: P108-052

Map 5 Watershed map showing stations used for fish sampling of carp (Cyprinus carpio) on river Büyük Menderes

OCP concentrations in liver tissues, some toxicologic parameters, enzyme activities and expression levels of genes coding the enzymes was measured on Carps fishes from every three stations by GC-ECD technique. 16 of 17 examined organochlorinated pesticides were found in samples. Heptachlore endoepoxyde not founded in any of the samples. 15 kind of OCP founded in samples gathered from Isıklı, 13 founded in Sarayköy and Söke.

From the Table 71 The highest OCP concentration was founded in Carp samples from Sarayköy of 4,4'-DDE chemical as 10.7 +- 7.8 ng/g in fresh tissue, the lowest was founded in Carps from Işıklı as 0.07+-0.2 ng/g β-HCH chemical in fresh tissue. α-HCH was founded in 21 of 25 samples, β-HCH in 3, γ-HCH and δ-HCH in 22 of 25 samples.

Although α-and δ-HCH levels measured in Işıklı and Sarayköy stations similar, levels measured in Söke station was interestingly low related to first two station. ($p<0.05$ and $p<0.01$ in order) There is no difference for the two other HCH, β- and γ-. Like HCH varieties, anldrine and endrine, were measured lower in Söke station. While dieldrine was not founded in Işıklı samples, aldrine was measured comperable to Sarayköy. Aldrine was measured more than Dieldrine, unlike Söke. Endrine and its metabolite endrine aldehyte concentrations were measured highest in Sarayköy and lowest in Söke. ($p<0.05$ and $p<0.01$ in order)

The highest α- and β- endosulfan concentration was measured in Sarayköy, significantly higher than the other two ($p<0.05$ and $p<0.01$ in order). Whereas metabolyte endosulphane sulphate was very low in Işıklı, very high in Sarayköy, higher than other two in Söke ($p<0.05$ and $p<0.01$ in order).
DDT and it's chemical analogue metosichlore and heptachlore, founded in only Işıklı samples. By the way DDE, which is a metabolyte of DDT was measured higher in Sarayköy compared to Işıklı ($p<0.001$) DDD, the other metabolyte of DDT was measured significantly lower in samples from Sarayköy and Söke than Işıklı, which has high concentrations.
While heptachlore was founded in only Işıklı samples, its metabolyte heptachlore endoepoxyte was not founded in any of the samples. Metosychlore was only measured in Işıklı station and in 3 of 25 samples.

Table 71 OCP concentrations in Carp liver sampled from Büyük Menderes river basin.

Compund	Concentration in fish tissue (*ng/g wet tissue*)		
	Işıklı Liver of CC	Sarayköy Liver of CC	Söke Liver of CC
α-HCH	1	1.2	0.4
β-HCH	0.07	0.13	0.12
γ-HCH (lindane)	1.2	0.7	0.8
δ-HCH	0.6	0.7	0.2
Aldrin	0.4	0.5	0.03
Endrin	1.1	2	0.4
Endrin aldehite	0.5	0.6	0.3
Dieldrin	0	0.3	0.1
α-Endosulfan	1.3	2.4	0.8
β-Endosulfan	0.7	2.5	0.9
Endosulfan SO_4	0.3	2.4	4.3
4,4′-DDT	1	0	0
4,4′-DDE	1.6	10.7	5.5
4,4′-DDD	5.6	2.2	1.7
Metoksiklor	0.5	0	0
Heptachlor	0.7	0	0
Heptachlor endoepoxide	0	0	0

POPs Levels In Humans

Organochlorine Pesticides (OCPs)

The level of organochlorine pesticides in human milk has been investigated in several countries during the last decade. Refik Saydam Hygiene Center's Poison Research Department Pesticide Residue Laboratory (PRL) had participated in one of the UNEP/WHO project on the assessment of organochlorine pesticides in human milk.This investigation was prepared by the coordinated UNEP/WHO pilot project on assessment of human exposure to organochlorine compounds in Ankara city.The project was divided into two main phases. The first was Quality Assurance phase, the second was monitoring.PRL had achieved satisfactory results in the Analytical Quality Assurance phase.For the monitoring phase , samples of human milk were collected during 1984 and 1985 from 52 donors, and analysed for organochlorine pesticides, using electron capture gas chromatography. (Yeniova,1992)

All the analytical results are given in Table 72. for OCPs.

Table 72 Pesticide residue levels in human milk

Pesticide Residue	$\bar{F}$at % x $\pm$ s	ppm (mg/kg $\bar{fa}$t)x $\pm$ s
HCB	3.48 + 0.31	0.079 + 0.025
α HCH	3.48 + 0.31	0.027 + 0.006
β HCH	3.48 + 0.31	1.166 + 0.212
Γ HCH	3.48 + 0.31	0.084 + 0.050
pp' DDE	3.48 + 0.31	3.12 + 0.404
pp' DDT	3.48 + 0.31	0.515 + 0.077

Compared data for all mothers and primiparea are in Table 73. From the comparison of the OCP data for all mothers and primiparea, it can clearly be seen that the concentrations are higher in the breast milk fat of primiparea than in the breast milk fat of all mothers. This result seems reasonable since OCPs are accumulated in the human organism during life span and breast milk of primiparea is consumed by the first baby.

Table 73 Levels of OCP in the fat of human milk for all mothers and primiparea in Turkey

mg/kg fat	Data for all mothers	Data for primiparea
Fat *	3.48	3.40
HCB	0.079	0.081
α HCH	0.027	0.025
β HCH	1.166	1.413
γ HCH	0.084	0.167
pp' DDE	3.12	4.49
pp' DDT	0.515	0.83
DDT	3.635	5.32

(*) % The monitoring data reported for OCPs are summarized in Tables 74 and 75 together with compared data for all countries .

Table 74 Mean levels of HCB and HCB isomers in the fat of human milk

Country	Mother's age	Number Of sample	% fat	mg/kg fat		
				HCB	β HCH	γ HCH
Belgium	26	47	2.7	0.3	0.2	<0.01*
China	27	100	2.5	-	6.6	0.03
Germany	25	81	3.1	1.1	0.28	0.062
India	24	50	4.8	-	4.6	0.037
Israel	26	52	3.4	0.06	0.29	<0.02*
Japan	27	107	3.1	0.063	1.9	0.011
Mexico	21	48	3.1	-	0.4	-
Sweden	27	58	2.8	0.084	0.085	0.003
Turkey	26	52	3.48	0.079	1.166	0.084
USA	28	50	2.6	-	<0.05*	-
Yugoslavia	26	50	3.7	0.21	0.28	-

(*) Limits of detection

It can be seen that the levels of β - HCH reported in the breast milk fat in China, India, Japan and Turkey are much higher than those reported in the other participating countries. As it is known, β- HCH is a minor but biologically persistent component in technical HCH.

Table 75 Mean levels of OCP in the fat of human milk.

Country /Area	Mother's age years	Number of sample	% fat	mg/kg fat		
				pp' DDE	pp' DDT	Σ DDT
Belgium	26	47	2.7	0.94	0.13	1.07
China	27	100	2.5	4.4	1.8	6.2
Germany	25	81	3.1	1.2	0.25	1.45
India	24	50	4.8	4.8	1.1	5.9
Israel	26	52	3.4	2.2	0.23	2.43
Japan	27	107	3.1	1.5	0.21	1.71
Mexico	21	48	3.1	3.7	0.71	4.41
Sweden	27	58	2.8	0.81	0.09	0.9
Turkey	26	52	3.48	3.12	0.515	3.635
USA	28	50	2.6	1.6	<0.1*	1.60
Yugoslavia	26	50	3.7	1.9	0.18	2.08

(*) Limits of detection

It can also be seen that that the levels of pp'-DDT and pp' DDE (the major metabolite of pp'-DDT) reported in human milk fat in China, India, Mexico and Turkey are higher than those reported from other participating countries (Table 84).

The ratios between the median levels of pp'-DDE and pp'-DDT are shown in Table 76. The ratio is lower for countries where pp'-DDT is still being used in agricultural vector control, (China and India) than in countries where its use has been severely restricted since 1970's.

Table 76 Median levels of pp' DDE and pp'DDT in the fat of human milk and the ratios of these substances.

Country/ Area	pp' DDE mg/kg fat	pp' DDT mg/kg fat	pp'DDE /pp'DDT
BELGIUM (Brussels)	0.94	0.13	7.8
CHINA (Beijing)	4.4	1.8	2.3
GERMANY (Hanau)	1.2	0.25	4.2
INDIA (Ahmedabad)	4.8	1.1	3.5
ISRAEL (Jerusalem)	2.2	0.23	11
JAPAN (Osaka)	1.5	0.21	7.4
MEXICO	3.7	0.71	4.7
SWEDEN (Uppsala)	0.81	0.09	9.4
TURKEY (2 cities)	3.120	0.515	6.06
USA (22 cities)	1.6	<0.10*	11
Yugoslavia	1.9	0.18	8.9

Table 77 shows calculated daily intake of OCPs by breast-fed child. Acceptable daily intake (ADI) of OCPs are given below.

Table 77 Calculated daily intake

COUNTRY	Calculated daily intake, mg/kg body wt Median				
	HCB	β HCH	γ HCH	pp' DDE	pp'DDT
Belgium	1.4	0.90	<0.05*	4.2	0.59
China	NR	30	0.14	20	8.1
Germany	5.0	1.30	0.28	5.4	1.1
India	NR	21	0.17	22	5.0
Israel	0.27	1.30	<0.09*	9.9	1.0
Japan	0.28	8.6	0.05	6.8	0.95
Mexico	NR	1.8	NR	17	3.2
Sweden	0.38	0.38	0.01	3.6	0.41
Türkiye	0.36	5.3	0.38	14.2	2.34
USA	NR	<0.23*	NR	7.2	<0.45*
Yugoslavia	0.95	1.3	NR	8.6	0.81

(*) Below the detection limit
(NR) No data

Accept table daily intake

DDT	=	5 mg/kg body weight
HCH	=	0.6 mg/kg body weight
γ-HCH	=	10 mg/kg body weight

The intake of DDT complex by some or most breast-fed infants in the participating countries exceeds the ADI. In the developing countries the ADI is exceeded by several fold by most infants. However the ADI is developed on the basis of lifetime exposure, while intake of contaminants via human milk is usually limited to a few months of a lifetime.

Organochlorine pesticides(OCP)have been used intensively in agriculture in Turkey for a relatively long period of time.The occurance of OCPs in the environment and subsequently in parts of the food chain,resulting in the intake of these compounds by man and animal already been noted since the early sixties.

Breast milk is at the top of the food chain and one of the good markers for the determination of environmental pollution created by OCPs.

The measurement of the levels of OCPs in adipose tissue of human populations are good markers in determining the extent of exposure and in the evaluating the hazards.The levels of OCPs in human adipose tissues have been the subject of a number of studies reporting the last two decades.Most interest has centered on DDT and its metabolites and HCH isomers.

In Turkey OCP residues have been monitored among Turkish population in human adipose tissue samples by carrying out regional survey at given time intervals since 1976 (Kayaalp 1979; Karakaya and Ozalp 1987; Burgaz et.al.1994).

One of the latest studies in human milk was done (Çok et.al., 1997)in agricultural regions of Turkey. In this study 104 human milk samples were collected from healthy donors living in two different regions of Turkey for at least 5 years.The age of mothers ranged from 17 to 44.

The regions were selected on the basis of similarities and differences in their environmental and socioeconomic characters: Manisa is in an industrialized and agricultural area, located in the west of Turkey, Van is an agricultural and stockbreeding region, located in east of Turkey (EPA). Residues of α-HCH, β-HCH, HCB, Heptachlorepoxide, and pp'DDE were found to be the major contaminants in milk samples of Manisa and Van residences. A detectable amount of α-HCH was found in 93%, β-HCH in 100%, γ-HCH in 45%, HCB in 96%, heptachlor epoxide in 96%, pp'DDT in 44% of the samples. Results are given in Table 78.

Table 78 Levels of OCP in human milk in Van and Manisa provinces.

(Mean±SD)

Compound	Van	Manisa	Average
HCB	0.058± 0.029	0.044± 0.027	0.050± 0.030
α-HCH	0.050± 0.020	0.067± 0.037	0.060± 0.032
β- HCH	0.417± 0.140	0.355± 0.137	0.380± 0.141
γ_HCH	0.016± 0.023	0.017± 0.028	0.017± 0.026
Σ-HCH	0.483± 0.152	0.441± 0.220	0.457± 0.167
HEPTACHLOR EPOXIDE	0.078± 0 028	0.069± 0.037	0.072± 0.034
P.P:DDE	2.263± 1.188	1.851± 0.700	2.013± 0.939
P.P:DDT	0.141± 0.168	0.072± 0.130	0.100± 0.149
ΣDDT[b]	2.670± 1.470	2.153± 0.906	2.357± 1.182

[a]ΣHCH= α HCH+ βHCH+ γHCH

[b]ΣDDT= 1.115 x p.p'.DDE + p.p'.DDT

HCB is one of the most persistent and toxic organochlorine contaminants.This compound has not been used since 1959 in Turkey. In this study it was found that 96% of all the milk samples contained HCB residues (Table 79). The reason of HCB residues are shown as in various industrial activities. HCB residues are produced as a by - product, presence in other pesticides as an impurity and the biological transformation of HCH to HCB.

Table 79 Average levels of OCPs in milk from mothers in different regions of Turkey (mg/kg fat basis)

City	Year	n	α̃HCH	β-HCH	γHCH	HCB	HE**	pp DDE	pp DDT	ΣDDT[b]	DDE	DDT	Ref
Sivas	1983	18	0.26	0.94	0.3	0.08	-	-	-	13.97	-		1
Ankara	84-85	61	<0.01	0.92	<0.01	-	-	2.71*	0.42*	3.66	6.45		2
Adana	84-85	52	<0.01	1.43	<0.01	-	-	8.55*	1.17*	10.57	7.31		2
Kocaeli	84-85	50	<0.01	0.72	<0.01	-	-	2.56*	0.37*	3.30	6.92		2
Kayseri	1989	51	0.096	0.522	0.156	0.084	0.011	2.39	0.41	3.07	5.61		3
Van	95-96	41	0.05	0.417	0.016	0.058	0.078	2.26	0.141	2.67	14.74		***
Manisa	95-96	63	0.067	0.355	0.017	0.044	0.069	1.85	0.072	2.15	17.45		***

* Median; **Heptachlor epoxide; ***Present study; References;

1) Çetinkaya et al. 1983; 2) Karakaya et al. 1987; 3) Üstünbaş et al. 1994

The ratio of DDE/DDT in this study is as high as that found in most developed and developing countries where DDT use has been prohibited since 1970s.

As shown in Table 80. ∑DDT ratio in milk tends to decrease gradually in our country.A significant difference has been found in ∑DDT levels between this study and a 1987 study (Karakaya et.al 1987) ($p<0.001$).

Table 80 Average OCP residues in human milk from various countries (μg/kg whole milk)

Country	Year	p.p'DDE	p.p'DDT	DDE/DDT	Reference
Israel	1985	79.0	8.46	9.33	Weisenberg et al. 1985
Italy	1985	1.4	0.25	5.6	Dommorco et al. 1987
Canada	1987	29.22	2.45	11.92	Dewailly et al. 1989
France	1990-1991	21.83	0.79	7.3	Bordet et al. 1993
Spain	1991	18.7	0.4	46.75	Hemandez et al. 1993
Egypt	1993	21.37	2.93	7.3	Saleh et al. 1996
Turkey	1995-1996	20.13	1.0	16.04	Present study

When the results of this study are considered it could be argued that due to the prevention, OCP residues tend to decrease in Turkey in terms of exposure to HCH both in industry and in agriculture more but strict preventions are needed.

- In the second study by Çok et.al.,1996, organochlorine pesticide residue levels in human adipose tissue of residents of Manisa (Turkey) were determined between the years 1995-1996.For this purpose 56 human adipose tissue samples(35 female and 21 male) were taken during surgical operations in Manisa State Hospital from different donors living in Manisa province for at least 5 years.The region is an urban city with agriculture among main activities.

Fifty-six adipose tissue samples were analysed by gas chromatography and the results of the subjects are shown in Table 81.

Table 81 Chlorinated hydrocarbon residues in adipose tissue in Manisa residents (The mean levels are expressed as mg/kg extracted fat basis)

COMPOUND	Mean	Range
HCB	0.033± 0.036	N.D.- 0.177
α-HCH	0.102± 0.067	N.D.- 0.339
β-HCH	0.374± 0.311	N.D.- 1.581
γ-HCH	0.043± 0.095	N.D.- 0.479
Σ-HCH	0.519± 0.339	0.129- 1.694
HEPTACHLOR EPOXIDE	0.121± 0 063	0.030- 0.316
p.p':DDE	1.832± 0.889	0.305- 3.938
p.p':DDT	0.088± 0.212	N.D.- 1.039
∑DDT	2.130± 1.026	0.305- 4.325

N.D. : under the detection limit
ΣHCH= α-HCH + β-HCH + γ-HCH
ΣDDT= 1.115 x p.p'.DDE + p.p'.DDT

Residues of α-HCH, β-HCH, HCB, heptachlor epoxide and pp'DDE were found to be major contaminants in the adipose tissue samples of Manisa residents. A detectable amount of α-

HCH was found in 93%, β-HCH in 96%, γ-HCH in 36%, HCB in 84%, heptachlor epoxide in 100%, pp'DDE in 100%, pp'DDT in 25% of the samples. These results indicated that the donors'obesity index did not correlate with the residue levels of OCP compounds in human adipose tissue.

The increase of level of OCPs with the increasing age is an expected finding, because it is well known that these chemicals accumulate in the body during life course and their metabolisms and elimination take place at a slow pace.

In a previously performed study on inhabitants of Ankara using adipose tissue it was found that HCB level was 0.164 ppm while in this study it is found as 0.033 ppm.This is a relatively lower value than those found in other studies which are held in Turkey (Burgaz et.al 1995).

The presence of heptachlor epoxide in Turkish adipose tissues has been reported as 0.021 ppm by Burgaz et.al (1994).In this study the amount of the heptachlor epoxide is found as 0.121 ppm which is significantly different than the previous one($p<0.01$).This result might be attributed to the fact that the collected samples from Manisa where agriculture is predominant and before prohibition of the use of heptachlor which is the source of heptachlor epoxide was common.

In Table 82, results of various studies performed in the Ankara region during 1976-1996 for the assessment of OCPs in adipose tissue are summarized.

Table 82 OCP levels in adipose tissue in Ankara Region of Turkey

(mg/kg fat basis)

Year	Region	n	∑HCH	pp'- DDE	pp'- DDT	∑DDT	DDE/ DDT	Ref
76-77	ANKARA	41	4.20± 0.73*	10.2± 0.64	3.20± 0.63	14.6± 1.38	3.19	1
84-85	ANKARA	48	1.72± 0.83	5.83± 3.31	0.62± 0.50	7.12± 4.10	9.40	2
91-92	ANKARA	60	1.54± 1.04	3.72± 3.59	0.27± 0.32	4.42± 4.16	13.77	3
95-96	ANKARA	56	0.59± 0.39	1.83± 0.89	0.09± 0.21	2.13± 1.03	20.82	**

(1) Kayaalp et al. 1979, (2) Kayaalp&Ozalp 1987, (3) Burgaz et al, 1994, * as γHCH, ** Present study

Mean levels of pp'DDE and pp'DDT in human adipose tissue from different countries are summarized in Table 83.

Since the year 1976 the increase in DDE/DDT ratio and decrease in ∑DDT and ∑HCH levels in adipose tissue demonstrate that the influence of limitations and inhibitions for OCPs and the decrease of utilization of these compounds in time.

Table 83 Mean levels (mg/kg extracted fat basis)of pp'DDE and pp'DDT residue levels in human adipose tissues from various countries.

Country	Year	pp'DDE	pp'DDT	DDE/DDT	Reference
Spain	1991	3.93	0.40	10.70	Gomez- Catalan et al. 1995
India	88-89	0.71	0.88	0.81	Nair et al. 1992
Kenya	1992	3.26	2.49	1.31	Kanja et al. 1992
Mexico	1991	10.00	4.02	2.49	Waliszewski et al. 1996
Germany	1990	0.44	0.09	4.69	Teufel et al. 1990
Poland	89-92	5.75	0.54	10.70	Ludwicki & Goralezyk. 1994
Iran	91-92	2.45	0.19	12.89	Burgaz et al. 1995
Turkey	95-96	1.83	0.09	20.82	Present study

In one of the latest studies done by Işcan et.al in 2001 association between the organochlorine pesticide residues and antioxidant enzyme activities in human breast tumors was investigated. Although its etiology remains unknown, environmental, genetic, nutritional and hormonal factors are established risk factors. The majority of breast cancers have been proposed to be of environmental origin.Among the environmental factors organochlorine pesticides as xenoestrogens have been suggested to play a causative role in breast cancer etiology although there are reports against it.

One of the risk factors for breast cancer is considered to stem from exposure to OCPs is because of their potential estrogenic activity and immunosupressive and tumor promoting properties. Breast tumor and surrounding tumor-free (normal,taken as control;up to 3 cm.from the tumor)were obtained from 24 female breast cancer patients with infiltrating ductal carcinoma aged between 28 and 72 who had undergone mastectomy in Oncology Hospital, Demetevler, Ankara, Turkey. In Table 84, the number and percentage of tumors and control breast tissues that had measurable OCP, GSH and LP levels and antioxidant and GST activities in 24 breast cancer patients are given.

Table 84The number and percentage of tumors and control breast tissues that had measurable OCP, GSH and LP levels antioxidant and GST activities in 24 breast cancer patients.

	Control		Tumor	
	N	**Percentage**	**N**	**Percentage**
α-HCH	22	92	22	92
β-HCH	23	96	22	92
γ-HCH	11	46	20	83
HCB	16	67	10	42
HE	17	71	23	96
p.p':DDE	24	100	22	92
p.p':DDT	19	79	12	50
ΣDDT	24	100	22	92
SOD	24	100	24	100
CAT	18	75	18	75
Se-GSH-Px	19	79	21	88
T-GSH-Px	19	79	21	88
GSH-Px II	11	46	13	54
GRd	24	100	24	100
GSH	20	83	24	100
CDNB	22	92	23	96
DCNB	12	50	18	75
EAA	20	83	19	79
ENPP	19	79	19	79
LP	24	100	24	100

42% to 100 % of the samples had detectable OCP residues.

No significant differences were found between β-HCH, HCB, pp'DDE, pp'DDT and ∑-DDT levels of tumors and control breast tissues.

In conclusion the elevation of certain OCPs and antioxidant capacity in tumors and correlation between some of them are likely to show that free-radical mediated oxidative stress is,at least partly, associated with these OCPs in human breast tumors (Table 85).

Table 85 The OCP levels in tumors and surrounding tumor free(control) breast tissues of 24 breast cancer patients.

	Control	**Tumor**
α- HCH	0.27± 0.06	1.20± 0.37[c]
	(ND- 1.72)[b]	(ND- 5.61)
β- HCH	3.43± 0.63	4.19± 1.07
	(ND- 14.43)	(ND- 25.77)
γ- HCH	0.26± 0.11	0.69± 0.20[d]
	(ND- 2.00)	(ND- 3.53)
HCB	0.64± 0.46	0.23± 0.11
	(ND- 2.03)	(ND- 2.43)
HE	0.40± 0.20	1.54± 0.47[e]
	(ND- 4.34)	(ND- 7.34)
pp':DDE	5.37± 1.06	5.18± 0.88
	(0.11-22.73)	(ND- 15.83)

pp':DDT	1.89± 0.59 (ND-13.74)	2.02± 1.10 (ND-24.31)
∑-DDT [f]	7.87± 1.60 (1.52-39.09)	7.80± 1.40 (ND- 27.06)

a-mg/kg fat,mean±SE b-min and max range.
c-Significantly different from respective control ($p<0.02$).
d-Significantly different from respective control ($p<0.01$)
e-Significantly different from respective control ($p<0.001$)
f-∑-DDT=1.115×p.p'DDE+p.p'DDT ND.not detected.

- In another study done between April 2002 and December 2002, 101 human milk samples were taken at the Ankara University, School of Medicine, Department of Obstetrics and Gynaecology, from different donors which had been living in the Ankara area for at least 5 years (Çok et al., 2004). Table 95. presents the mean concentrations of OCPs in human milk samples from 101 women. Residues of β-HCH, HCB, p.p'. DDT, and p.p' DDE were found to be the major contaminants in milk samples of Ankara residents. Frequency of OCPs , mean of the obtained values and ranges are also listed in Table 86. Results show that the Ankara population still has detectable OCP levels.

Table 86 OCP Residues (mg/kg fat basis) in human milk samples of Ankara residents

Pesticide	Mean(± S.D.)	Range	Frequency (%)
HCB	0.15 ±0,24	N.D - 1.024	50.49
α- HCH	0.05± 0.15	N.D - 0.881	14.85
β- HCH	0.49± 0.65	N.D - 2.975	62.37
γ- HCH	0.01± 0.05	N.D - 0.342	11.88
∑- HCH	0.55±0.69	N.D – 2.975	
HEPTACHLOR EPOXIDE	0.06±0.19	N.D – 1.200	17.82
pp.' DDE	2.28±2.86	N.D – 12.220	95.05
pp.'DDT	0.13±0.30	N.D – 2.734	82.17
∑- DDT	2.66±3.40	N.D – 14.090	

N.D. : Under the detection limit
∑- HCH = α-HCH + β- HCH + γ- HCH
∑- DDT = 1.115 x p.p.' DDE + p.p.' DDT

Table 87. compares earlier results of Karakaya et al. (1987) to the results obtained in this study. As seen in Table 87, OCP levels in human milk samples from subjects who live in Ankara have decreased by time.

Table 87 Mean levels of OCP residues in human milk from residents of Ankara over period 1984-2002

Year	N	α-HCH	β- HCH	γ- HCH	HCB	Heptachlor epoxide	p.p.'DDE	p.p'.DDT	∑DDT	∑HCH	DDE /DDT
1984-1985*	61	0.14	1.30	0.02	-	-	3.28	0.73	4.15	4.39	4.50
2001-2002*	101	0.05	0.49	0.01	0.15	0.06	2.28	0.13	2.66	0.55	17.67
P***		<0.001	<0.001	<0.001	-	-	<0.001	<0.001	<0.001	<0.001	<0.001

(The mean levels expressed as mg/kg extracted fat basis) , * Karakaya et al (1987). ** Present study. ***

Table 88 shows the levels and trends of the main residues of OCPs in adipose tissue samples over the 15 years that surveys were carried out in Ankara.

Table 88 OCP residue levels in adipose tissue in Ankara residents.

Year	N	α-HCH	β- HCH	γ-HCH	HCB	Heptachlor epoxide	p.p.' DDE	p.p'. DDT	∑DDT	DDE /DDT
1976-1977*	41	-	-	-	-	-	10.2	3.20	14.60	3.19
1984-1985**	48	0.19	1.52	-	-	-	5.83	0.62	7.12	9.40
1991-1992***	60	0.16	1.52	0.017	0.16	0.062	3.72	0.27	4.42	13.53

(The mean levels expressed as mg/kg extracted fat basis) , * Kayaalp et al 1979** Karakaya and Özalp 1987.*** Burgaz et al.. 1994

Heptachlor epoxide was clearly detected in some samples (17.82%). The presence of heptachlor epoxide in different regions of Turkey included in Ankara have been reported earlier (Burgaz et al., 1994; Çok et al., 1998). The level of heptachlor epoxide in human adipose tissue samples of Ankara residents has been reported as 0.021 ppm by Burgaz et al., 1994. In this study, the amount of heptachlor epoxide was found to be 0.06 ppm which is significantly different than the previous one ($p<0.05$). The heptachlor epoxide levels in human body might have originated from heptachlor as an oxidation product, given that it was used as a pesticide in Turkey until 1985.

HCB is a widespread contaminant that has entered the environment through its past manufacture and use as a pesticide and its formation as a by-product during the production of a variety of chlorinated compounds. Average HCB residue levels in adipose tissue of Ankara residents have been reported as 0.164 ppm (Burgaz et al., 1994). In this study the level of HCB was found as 0.152 ppm. Indeed, HCB is the most striking one among the OCPs that have been analysed. The values tend to be consistent over the years, even though expected to decrease. Concentration of HCB was found to be lower in other parts of Turkey (Çok et al., 1998; Çok et al., 1999). The presence of HCB in human milk can be attributed to various activities and other pesticides (PCNB, PCP, DCPA etc) (Tobin, 1986). Although the agricultural usage of pesticides and industrial activities such as waste by - products in specific manufacturing processes have created considerable amounts of HCB impurities. The need for more comprehensive studies on the causes and sources of HCB exposure, is indicated by this research.

Experimental and epidemiological studies show that DDE/DDT ratio increases with time after exposure or after the limitation or restriction of DDT usage. In this study, DDE/DDT ratio was found as 17.67 which is quite higher than that obtained in the 1987 study by Karakaya et al. which was 4.50 ($p<0.001$) . On the other hand, in the studies that have been performed on adipose tissue samples, this value was calculated as 3.19 an 1976 (Kayaalp et al., 1979), 9.4 an 1984 (Karakaya & Özalp 1987) and 13.53 in 1991 (Burgaz et al., 1994). When we consider DDE/DDT ratios, it is seen that the limitation and legislation for OCPs in Turkey has been effective and the exposure to these compounds tends to decrease in time.

The most recent study was conducted by Erdoğrul et. al., 2004 in Kahramanmaraş region. Human milk samples were obtained by the Kahramanmaraş Sütçü imam University, Faculty

of Science and Arts, Department of Chemistry, Division of Biochemistry, between March and July 2003 from 37 healthy mothers living in the Kahramanmaraş area for at least 7 years. The concentrations of organochlorine pesticides found are shown in Table 32. The sum of DDTs in human milk samples varied between 0.52 and 315.8 ng/g wet weight. The mean ratio between pp'DDE and pp' DDT was 31.1. The pp' DDD isomer could be measured only in a lower number of samples (14%). β-HCH was the most prevalent HCH isomer with a mean value of 2.08 ng/g ww (Table 89). The mean concentration of γ-HCH was 0.38ng/g ww, while α-HCH was not detected in any sample. HCB is found in 35 of human milk samples (94.6%) with a mean concentration of 0.30 ng/g ww. PCBs could be measured only in 8 out of 37 samples, while in the other samples the concentration for the sum of PCBs was below the detection limit of 0.15 ng/g ww (Table 89). The range of the sum of the PCBs was 0.21-1.92 ng/g ww. The most frequently detected PCB congeners were PCB 118, PCB 138, PCB 153, PCB 170, and PCB 180 .The concentrations of detected PCB congeners were lower than those found by Çok et. al. (2003). This can be due to a lesser degree of industrialization of the Kahramanmaraş region compared to Ankara.

Considering an average diet of 750 g for breast fed infants and the mean Σ DDT concentrations presented in Table 98, the estimated daily intake (EDIs) was 24 μg for total DDT. Considering an average infant of 7.5 kg (up to 6 months), these EDIs were only 16% of the WHO acceptable daily intake (ADI) of 20 μg/kg body/ day for total DDT. Therefore, the consumption of milk with mean levels of DDTs does not pose a risk to the infant's health, but can be problematic for subjects fed with milk containing DDTs at the higher end of the observed range of concentrations (Table 89).

Polychlorinated biphenyls (PCBs)

Polychlorinated biphenyls (PCBs)are a mixture of 209 possible congeners with different chlorine substitutions and they are potentially hazardous compounds in the environment for human beings.The high liphophilic character and the resistance to biodegradation of PCBs allow the bioaccumulation of these chemicals in the fatty tissues of organisms.

PCBs are known to cause chronic reproductive effects, gastric disorders,and skin lesions in laboratory animals.In addition,the US Environment Agency(1996)suspects that PCBs are probable human carcinogens.

- A study was completed in 2001 in Ankara by Çok et.al based on polychlorinated biphenyl (PCBs) concentrations in human milk and adipose tissue of women in Ankara,Turkey.

Polychlorinated biphenyls (PCBs) have been used worldwide since 1929 and despite restrictions on their production, usage and disposal which have been in force for many years,they continue to persist in the environment. PCBs have been used in exchange and dielectric fluids;as stabilizers in paints,polymers and adhesives; and as lubricants in various industrial processes.

In this study human milk and adipose tissue samples were obtained between April 1999 and February 2000 from 32 mothers who had been living in Ankara for at least 5 years.

In this study, seven PCBs congeners (IUPAC Nos. 21, 52, 101, 118, 138, 152, 180) were selected, as many European governments and regulatory bodies use them as marker

compounds to monitor occurence and distribution. Table 89 presents the mean concentrations of PCBs in breast milk fat samples from 32 women.

Table 89 Mean, median, standard deviation and range of concentrations (ng/g wet weight) for individual organochlorine pesticides and selected PCB and PBDE congeners measured in 37 individual human milk samples from Kahramanmaraş, Turkey

Compound	Mean	S.D.	Median	Range	LOD
	ng/g wet weight				
α-HCH	ND	ND	ND	ND	0.05
γ- HCH	0.38	0.28	0.27	ND-1.12	0.05
β- HCH	2.08	3.55	0.69	ND-13.5	0.05
ΣHCHs	2.20	3.55	1.02	ND-14.0	0.15
HCB	0.30	0.28	0.18	ND-1.13	0.05
Oxychlordane	0.28	0.23	0.20	ND-0.74	0.05
Trans-chlordane	ND	ND	ND	ND	0.05
Trans-nonachlor	0.17	0.12	0.11	ND-0.36	0.05
Cis-chlordane	ND	ND	ND	ND	0.05
ΣCHLs	0.39	0.35	0.28	ND-1.10	0.20
pp'-DDE	31.3	53.8	13.9	0.44-313.5	0.05
pp'-DDT	0.16	0.13	0.11	ND-0.48	0.05
pp'-DDD	0.07	0.03	0.06	ND-0.11	0.05
pp'-DDT	0.95	1.09	0.70	0.07-6.52	0.05
ΣDDTs	32.4	54.2	14.9	0.52-315.8	0.20
PCB 28	0.03	0.03	ND	ND-0.07	0.02
PCB 74	0.05	0.03	0.06	ND-0.10	0.02
PCB 99	0.08	0.03	0.06	ND-0.12	0.02
PCB 118	0.16	0.10	0.16	0.03-0.29	0.02
PCB 138	0.19	0.09	0.19	0.04-0.32	0.02
PCB 153	0.34	0.19	0.33	0.08-0.66	0.02
PCB 170	0.07	0.04	0.06	0.04-0.32	0.02
PCB 180	0.15	0.08	0.15	0.04-0.27	0.02
ΣPCBs	1.08	0.61	1.10	0.21-1.92	0.15
BDE 47	0.006	0.005	0.004	0.003-0.012	0.001
BDE 99	0.002	-	0.002	0.002	0.001
ΣPBDEs	0.008	0.004	0.006	0.005-0.014	0.003

Mean and median concentrations for PCBs and PBDEs were calculated for samples above the limit of detection. Values below the limit of detection were set to zero.

ND: not detected.

Human milk samples were taken from women who lived in Ankara,.which is an industrial city located in the central part of Turkey, quite far from the seas and big lakes. Nevertheless all subjects had a mixed diet including fish.

PCBs IUPAC No.153 was a high contributor of the congener occupying 41% of the total PCBs content, and together with No.180 of 23% and No.138 of 20% were the most prevalent members,which seem to be parallel to studies conducted in other countries.Because of the very long biological half-lives of these chemicals, concentrations of PCBs congeners 138,153 and 180 in body fat are expected to increase with age. In Table 90-110, the levels of seven PCBs in human milk found in the present study are compared with that of those of some other countries.

Table 90 Mean concentration of 7 PCBs Congeners in Human Milk of Residents of Ankara
(ng/g on a lipid wt. basis)

Structure	IUPEC	Mean SD	Range	%
2,4,4'Triclorobiphenyl	28	5,7± 16,8	0,0-35,4	18,8
2,2,5,5'Tetrachlorobiphenyl	52	10,3± 21,3	0,0-55,7	25
2,2',4,5,5'Pentachlorobiphenyl	101	6,6± 25,2	0,0-71	9,4
2,3,3'4,4'Pentachlorobiphenyl	118	18,9± 48,4	0,0-313,3	18,8
2,2',3,3',4',5Hexachlorobiphenyl	138	54,3± 124,4	0,0-329	46,9
2,2'4,4'5,5'Hexachlorobiphenyl	153	110± 141,1	0,0-416,5	56,3
2,2'3,4,4',5,5' Heptachlorobiphenyl	180	59,8± 101,5	0,0-266	46,8

Table 91 Comparison of level of indicator PCBs in human milk from Turkey (Ankara) with the similar studies from various other countries

Country	28	52	101	118	138	153	180	Ref
Great Britian (1991) (n=32)	31,25	26,2	15	28,6	68,1	85,9	74,9	1
Czech Rep. (1996) (n=17)	Nd	Nd	Nd	28,5	289	379	240,2	2
Germany (1995) (n=68)	17	13	14	*	168	240	173	3
France (1993) (n=20)	31	68	30	37	99	80	103	4
Norway (1994) (n=28)	7,8	*	1,1	26.2	86.8	114.4	50.6	5
Canada (1995) (n=497)	4,75	0,87	*	16,6	28	38,3	20,9	6
Ukraine (1999) (n=197)	14#	18#	23#	93#	134#	149#	55#	7
Turkey (2001) (n=32)	5,7	10,3	6,6	18.9	54,3	110	59.8	**

(1) Duarte- Davitson et al. 1991; (2) Schoula et al. 1996; (3) Georgii al. 1995; (4) Bordet et al. 1993; (5) Jahansen et al.1994; (6) Newsome et al. 1995; (7) Gladen et al.1999 Nd: below the limit of quantification, *not analysed, # Median, **Present study, ng/g fat bs

The high liphophilic character and the resistance to biodegradation of PCBs allow the bioaccumulation of these chemicals in fatty tissues of organisms and their biomagnification through food chains.Because humans are located at the top of the most food chains,relatively high levels of these compounds have been found in human adipose tissues and breast milk fat.Because of the bioaccumulation and toxicity, usage of the PCBs for different purpose have been restricted or banned since the begining of the 70’s in most countries (Table 91).

In Turkey, organochlorine pesticide residues have been monitored in the Turkish population by carrying out regional surveys at given time intervals since 1976 (Karakaya et al.1987; Burgaz et al.1994;Cok et al.1997; Cok et.al.1998).But there have been no national documentation for PCB contamination for several environmental compartments (air,drinking water,sediment, food, fish, human milk, adipose tissue) except one study (Cetinkaya et al.1983) which has very limited information on PCBs contamination.Because of this reason,the results of this study are very important to provide baseline data on the concentrations of PCB contaminants in Turkey.

In a study conducted in Germany by Çetinkaya et al.(1983), in human milk samples, provided from Turkish mothers who had lıved in Germany,total PCBs has been found as 1.28 mg/kg.On the other hand, in samples of five human milk samples provided from Ankara region, no PCB congener has been found.These results indicate the role of industrialization. Since 1983 there have been a variety of uses of PCBs as a result of industrialization.

PCBs were used as coolant/dielectrics in electrical transformers capacitors and other electrical equipment in several countries including Turkey.However no statistical data is available on use of PCBs in Turkey. After 1977 PCBs are almost entirely restricted for use in closed systems in most countries.In Turkey, after 1993 PCBs are restricted for use in closed systems and banned after 1996 according to the Toxic Substances Control Act. Because PCBs are used in nominally closed applications such as in heat transfer and hydraulic fluids,exposure can still occur through refilling and repairment activities.

- Another study was done by Çok et.al. (2000) on adipose tissue in the same period as the previous study.Between April 1999 and February 2000,29 human adipose tissue samples were taken during surgical operations from the Ankara University, School of Medicine, Department of Obstetrics and Gynaecology from different donors which had been living in Ankara area for at least 5 years. All subjects participating in the study were female and primiparous women.

PCBs may be divided into several subgroups according to various criteria.For the purpose of regulation and to have a mean for comparison data from various laboratories,seven PCB congeners (IUPAC Nos. 28, 52, 101, 118, 138, 153, 180) were selected as indicator compounds to monitor occurance and distribution.

Table 92 presents the mean concentrations of PCBs in adipose tissue samples from 29 women.In this study, subjects that donated adipose tissue were composed of primiparous women. It is known that excretion of organochlorine compounds which accumulate in the adipose tissue increases with births.

More than 90% of the total daily human exposure to PCBs is made up of oral intake from food such as dairy products, meat and fish, whereas other routes, e.g., water, air and soil contribute to less than 10% of total exposure .Human adipose tissue was collected from women living in Ankara which is an industrial city in central part of Turkey, quite far away from the seas and big lakes. Nevertheless, all subjects reported having a mixed diet including meat and fish, PCBs sources for people living in Ankara were careless disposal practices, accidents, leakage from various industrial facilities and from chemical waste disposal sites.

Table 92 Concentration of 7 PCBs Congeners in Human Adipose Tissues of Residents of Ankara

(ng/g on a lipid wt. basis)

Structure	IUPEC	Mean ± SD	Range	% Positive Samples
2,4,4' Triclorobiphenyl	28	5.0 ± 8.8	ND-35.4	34.5
2,2',5,5' Tetrachlorobiphenyl	52	11.4± 18.9	ND-55.7	31.0
2,2',4,5,5' Pentachlorobiphenyl	101	10.4± 22.6	ND-79.8	78.8
2,3',4,4' Pentachlorobiphenyl	118	40.7± 89.5	ND-313.3	24.1
2,2',3,4,4',5 Hexachlorobiphenyl	138	82.3± 88.5	ND-329	65.5
2,2',4,4'5,5' Hexachlorobiphenyl	153	141.7± 132.3	ND-416.4	69.0
2,2',3,4,4',5,5' Heptachlorobiphenyl	180	91.8± 122.8	ND-505.8	58.6
Σ PCB		383.3		

ND: Under the detection limit.

Table 93 PCBs Residue levels in human milk and adipose tissue in Ankara residents (ng/g on a lipid wt. basis.)

	Year	28	52	101	118	138	153	180	Σ PCB	Ref.
Human Milk	1999-2000	5.7	10.3	6.6	18.9	54.3	110.0	59.8	265.6	Çok et all. (2003)
Adipose tissue	1999-2000	5.0	11.4	10.4	40.7	82.3	141.7	91.8	383.3	Present study

Congeners PCB 153, PCB 180 and PCB 138 contain six to seven chlorine atoms that are components of commercial PCB mixtures. These congeners have high persistency capacity in living organisms and they are commonly detected in human adipose tissue as major PCBs compounds. The age- related increase in adipose tissue levels of PCBs might be attributed to their long persistence in the environment and their bioaccumulation. Because of their very long biological half-lives of these chemicals, concentrations of PCB congeners 138, 153 and 180 in body fat are expected to increase with age .As mentioned before 3 PCBs congeners were dominating (PCB 153, PCB 180 and PCB 138). The higher level of these three compounds compared to other PCB compounds detected in this study seems to be similar to results obtained in other countries. In Table 93. previous results of Çok et. al. (2003) on the analysis of human milk samples are compared with the results from the present study. The subjects in the two studies had been living in Ankara during the same period. The 3 PCBs compounds (IUPAC Nos. 138, 153 and 180) were also major components in the milk samples collected in the Ankara region.

In Table 94, the levels of seven PCBs in human adipose tissue found in the present study are compared with levels obtained in some other countries.The concentrations of PCB 28, PCB 52 and PCB 101 were found to be higher than those found in industrialized countries. The reason could be attributed to the fact that exposure of these compounds continues in Turkey. On the other hand, the concencentrations of higher chlorinated PCBs (nos. 138, 153 and 180) are much lower than in Spain, Poland and Sweden. These results indicate the role of industrialization and increased number of chemicals used in industry, agriculture and home.

Table 94 Comparison of levels of indicator PCBs in adipose tissue from Turkey (Ankara) with similar studies from various other countries (ng/g fat basis)

Country	No. Of Congener	28	52	101	118	138	153	180	Ref
Poland (1994) (n=20)	55	13.0	1.7	4.2	71.0	230.0	290.0	175.0	1
Belgium (2000) (n=46)	7	2.8	2.7	3.0	57.1	68.3	145.3	93.7	2
Italy (2000) (n=10)	37	*	*	3.0	20.7	58.0	112.0	85.5	3
Spain (2000) (n=35)	33	4.9	0.9	2.0	47.0	220.0	300.0	280.0	4
Sweden (2000) (n=28)	33	4.1	1.4	2.3	40.0	230.0	300.0	200.0	5
Chile (2000) (n=10)	37	*	*	*	3.2	6.2	11.0	7.8	6
Turkey (2001) (n=29)	7	5.7	10.3	6.6	18.9	54.3	110.0	59.8	7

*:Not analyzed 1- Falandysz et al. (1994) 2- Pauwels et al (2000). 3- Mariottini et al (2000). 4- Wingfors et al (2000). 5- Wingfors et al (2000). 6- Mariottini et all (2000). 7- Present st.

- Another Ph.D. thesis was completed in 1999 on assessment of both human and environmental exposure to PCBs and human exposure to OCPs in the Ankara region in Ankara University Forensic Medicine Institute (Yeniova and Vural, 1999).

This research was prepared on the assessment of human and environmental exposure to PCBs in Ankara. For the monitoring phase, samples of postmortem adipose tissue were obtained from autopsies in Ankara Bureau of Medical Jurisprudence from 50 donors. Human milk samples were collected in Ankara region from 50 mothers. 15 samples of soil were collected from the vicinity of the Laboratory of TEIAS, and 20 samples of sediment were collected from the canal between Mogan and Eymir Lakes. All samples were analyzed for PCBs and organochlorine pesticides with gas-liquid chromatography with electron capture detector and filled column. These results are shown in Tables: 95, 96, 97.

50 samples of of postmortem adipose tissue collected from the Ankara region, obtained from the Bureau of Jurisprudence in Ankara which were analyzed for OCPs were tabulated according to concentration in an decreasing order: PP'-DDE, β-HCH, PCB, HCB, PP'-DDT, γ-HCH, α-HCH.

Table 95 OCP and PCB levels in postmortem adipose tissue (mg/kg fat basis)

Residue	Mean(± S.D.)	Median	Range	Percentage of Frequency
PCB's	0.180 ±0.163	0.134	N.D - 0.780	96
HCB	0.064±0,074	0.042	0.0006-0.426	100
α- HCH	0.004± 0.010	0.002	N.D - 0.067	42
β- HCH	0.310± 0.286	0.220	0.008-1.341	100
γ- HCH	0.031± 0.085	0.004	N.D - 0.540	66
∑- HCH[a]	0.346±0.304	0.244	0.046-1.345	
p.p.' DDE	1.74±1.69	1.235	0.190-7.819	100
p.p.'DDT	0.070± 0.120	0.026	N.D – 0.619	70
∑- DDT[b]	2.039±1.972	1.461	0.267- 9.336	

N.D. : Under the detection limit.

a: ∑- HCH = α-HHC+ β- HCH+γ- HCH b: ∑- DDT= 1.115x p.p.' DDE+ p.p.'DDT

Table 96 OCP and PCB levels in human milk (mg/kg fat basis)

Residue	Mean(± S.D.)	Median	Range	Percentage of Frequency
PCB's	-	-	-	-
HCB	0.0469 ±0.0447	0.0334	N.D.- 0.1904	92
α- HCH	0.0308± 0.0475	0.0051	N.D - 0.1807	60
β- HCH	0.3410± 0.3308	0.2115	N.D.- 1.2583	96
γ- HCH	0.0326± 0.0273	0.0318	N.D - 0.0946	76
∑- HCH[a]	0.4243±0.3613	0.3236	0.0201-1.2595	
p.p.' DDE	1.5486±1.8567	0.7749	0.0868-9.2981	100
p.p.'DDT	0.1457± 0.2234	0.0273	N.D – 0.7769	66
∑- DDT[b]	1.8789±2.1695	1.0211	0.0968- 10.4161	

N.D : Under the detection limit

a: ∑- HCH = α- HCH+ β- HCH+γ- HCH b: ∑- DDT= 1.115x p.p.' DDE+ p.p.'DDT

In the milk samples collected from mothers in the Ankara region, the order of concentration was as follows: PP'-DDE, β-HCH, HCB, γ-HCH, PP'-DDT, α-HCH.

The concentrations of analyzed OCPs and PCBs showed similarity in adipose tissue and human milk. However, the PCBs residue level in human milk was below detection limits.

This result might be attributable to the fact that the mean age of human milk donors was lower than that of the adipose tissue donors.

Table 97 PCB levels in soil and sediment

Material	Median	Range	Percentage of Frequency
Soil	50.0030	0.527-464.4	100
Sediment	0.0029	N.D.- 0.01962	55

As far as soil analysis is concerned, the samples collected from the vicinity of the TEDAŞ laboratory in Ankara where electrical transformer oils containing PCBs were changed and the results revealed that all samples contained high concentrations of PCBs, namely Aroklor 1260.

Sediment samples which were collected from the canal between Mogan and Eymir Lakes, a region chosen bearing in mind that PCBs are transported via natural means and go through biotransportation were also found to contain the same type of PCBs.

Also, PCBs level in adipose tissues of donors in Turkey are quite lower than in the industrialized countries such as Japan or were slighly lower when compared to Finland, Canada and USA. But differences in analytical methodology, time of collection of samples, living area of donors and other parameters make it difficult to compare our results with other surveys. The other and this survey indicate the nonocupational exposure to PCBs in Turkey. Use of PCBs has been recently restricted and due to their extreme persistence in the environment, the survey must be expanded as a national survey at some intervals. In addition, PCBs, are still found in soil and sediments.

Historically, there have not been a long-term regular monitoring study of reference POP levels in Turkey's environment. It is a fact woth noting that numner of the studies concerning persistent chemical substances has substantially grown over the last ten years.

Determining of contaminated sites, is only the first step in the long way to remove dangerous pollutants from environment. Next steps include, understanding the final situation of PCB's in related areas or common environmental break down mechanisms. Lastly, the final issue would be to develop efficient recovery strategies for polluted areas. Because of disposal alternetives,after-service-life management of PCB including existing devices is a difficult subject. Currently, the only licensed plant to dipose of these kind of waste is in İzmit.Therefore, majority of these products will be exported to European Countries for disposal.

Preventing areas from pollution is a sustainable sollution and integrated pollution prevention and control approach is necessary in industries especially in those which deals in toxic chemical processes. This is correct and inevitable even for countries that take on such huge as a result of requirements from Stockholm Convention such as to define stocks and equipments that contains toxic substances, to determine polluted areas and improve them

Table 98. Reference PCB levels in various environment.

Medium	**Location**	**Survey year**	**n[a]**	**$\sum_{\#congeners}$ PCBs[b]**
Soil	EMEP station, Czech Republic	1996-2005	1/year	$\sum_7$ BQL-40 (7.3)
Soil	Middle and South Europe	2005	6 21	$\sum_7$ 1.3-2.3 (1.8) $\sum_7$ 1.8-20.1 (6.8)
Soil	Background surface soil across the world	1998	191	$\sum_{27}$ 0.026 – 97 (5.4)
Soil	Rural/remote soils USA	2003	27	$\sum_{209}$ 0.255-24.6 (3.08)
Soil	Great Britain	-	200	$\sum_{33}$ 0.274-80.6
Soil	Lithuania	2006	5	$\sum_7$ 0.6-24 (5.94)
Sediment	EMEP station, CR	1996-2005	1/yıl	$\sum_7$ 0.23-7.1 (2.2)
Sediment	CEE	2005	50	1-143
Sediment	Baltic Sea	1968-1997	1/yıl	$\sum_7$ ~15 - ~60
Air	Lithuania	2006	5	$\sum_7$ 0.017-0.44 (0.1)
Air	EMEP station, CR	1996-2005	1/hafta	$\sum_7$ BQL-0.390 ng/m$_3$ (0.084) gaz fazında $\sum_7$ BQL-0.215 ng/m$_3$ (0.031) partikül faz
Air	CEE	2005	6 21	$\sum_7$ 0.04-0.16 (0.11) $\sum_7$ 0.04-0.73 (0.20)
Fresh water	EMEP station, CR	1996-2005	1/yıl	$\sum_7$ BQL-20 ng/L (2.1)
Mussel	Asia – Pasific	1994, 1997, 1998, 1999, 2001		$\sum_{toplam}$ 35-3000 (12 ülke için ortalamaların aralığı)

[a] n indicates number of samples or sampling frequency.

[b] The units of concentration for PCBs are; for solid samples, ng/g dry weight, for air samples ng/m3, for liquid samples ng/L, for biota samples ng/g lipid. Mean values are given in parenthesis. BQL=Below Quantification Limit.

Table 99 A summuary of regional distributions of PCBs in soil (ng/g dry weight) in Turkey.

Place	Study Year	n[a]	Sampling Region	Unit	PCBs[b] Amount
Gölbaşı, Ankara	1997	18	Rural, Industrial	Σ_{Ar1260}	0.53-464[c]
Antalya	1998	1	Unprocessed	Σ_{29}	0.344
Aliağa, İzmir	2001	1	Industrial	Σ_{7}	640
Aliağa, İzmir	2005	6	Urban, Industrial,	Σ_{40}	4.9-66
Aliağa, İzmir	2004-2006	48	Rural, Industrial	Σ_{41}	0.23-805
Gölbaşı, Ankara	2007	11	Rural, Industrial	$\Sigma_{Ar1016+1260}$	ND – 10 [c]
Gölbaşı, Ankara	2007	30	Rural, Industrial	$\Sigma_{Ar1016+1260}$	ND – 84
Iskenderun, Hatay	2008	20	Industrial	Σ_{41}	17±17

[a] n indicates sample number.
[b] PCB unit: "$\sum_{18}$"18 indicates sum of the compenent. "$\sum_{Ar1016}$" **indicates** Aroclor 1016 type PCB concentration. "$\sum_{Ar1016+1260}$" **indicates the sum of type** Aroclor 1016 and Aroclor 1260 PCBconcentration. Range and/or average±standard deviation concentrations are taken from the related reference. ND= Methode below detection level.
[c] µg/g dry weight.

Table 100 An overview of spatial distribution of PCBs in sediment (ng/g dry weight) in Turkey.

Location	Survey year	n[a]	Sampling area	Bases[b]	PCBs Amount
Mersin	-	8	Urban coastline	Σ_{Ar1254}	< 2-4
Bosphorous, Black Sea	1995	10	Rural	Σ_{Ar1254} Σ_{Ar1260} Σ_{13}	0.3-4.9 <0.06-1.55 0.45-4.43
Eymir Lake Ankara	1997	20	Rural, industrial	Σ_{Ar1260}	ND-196
Mid Black Sea Region	1999-2000	14	Urban rivers and coastline	Σ_{Ar1254} Σ_{Ar1262}	ND
Aliağa, İzmir	2001	3	Industrial	Σ_{7}	81-320
Mediterranean Sea	2003	8	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND ND-1.96
Mediterranean Sea	2004	8	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND-117 ND-121

Mediterranean Sea	2005	11	Coastline	Σ_{Ar1254} Σ_{Ar1260}	87-513 32-195
Mediterranean Sea	2006	7	Coastline	Σ_{Ar1254} Σ_{Ar1260}	0.36-23 0.32-15.9
Mediterranean Sea	2007	21	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND-18.4 ND-16.5
Mediterranean Sea	2008	42	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND-12.5 ND-13.7
Eymir Lake Ankara	2007	4	Rural,Recreational	$\Sigma_{Ar1016+1260}$	ND-84
İstanbul Strait	2007	17	Urban	Σ_{18}	0.02-540
Ankara Creek	2008	23	Urban, industrial	$\Sigma_{Ar1016+1260}$	6-777

[a] n indicates number of samples.
[b] Basis for PCB concentration: "$_{18}$" indicates sum of 18 congeners, "$_{Ar1016}$" indicates PCB concentration as Aroclor 1016, whereas "$_{Ar1016+1260}$" indicates concentration as sum of all PCBs given by sum of Aroclor 1016 and Aroclor 1260. The range and/or mean±stdev concentrations are given as obtained from the respective reference.
ND=not detected.

Table 101 An overview of spatial distribution of PCBs in air (ng/m3) in Turkey.

Location	Survey year	n[a]	Sampling area	Bases[b]	PCBs[b] Amount
Aliağa, Izmir	2005	26	Urban, industrial	$\sum_{36}$	0.3-3.14
Güzelyalı Port,Izmir	2005	16	Urban, industrial	$\sum_{29}$	1.72-2.12
Bursa	2004-2005	15-25	Urban, industrial	$\sum_{41}$	0.02-1.6
Aliağa, İzmir	2004-2005	~ 30	Urban, industrial	$\sum_{41}$	1.16-3.37
Meram, Konya	2006-2007	-	Urban	$\sum_{6}$	0.11
Aliağa, İzmir	2007	11	Urban, industrial	$\sum_{41}$	62±35

Table 102 An overview of spatial distribution of PCBs in aqueous phase (ng/L) in Turkey.

Location	Survey year	n[a]	Sampling area	Bases[b]	PCBs[b] Amount
Izmit Bay, Izmit	1999	9	Urban coastline	$\Sigma_{\#16-\#209}$	1.96-23.2
Ordu and Sinop	1999-2000	6	Urban coastline	$\sum_{Ar1254+1260}$	ND
Güzelyalı Port,Izmir	2005	16	Urban coastline	$\sum$29	0.25-0.39
Konya	-	5	Urban Wastewater Collection System	$\sum$6	0.27-1.39
Konya	-	17 5	Urban Wastewater Collection	$\sum$6 $\sum$6	505-2377 27-44

			System Urban Water Supply System		
Konya	-	5	Urban Wastewater Collection System	∑6	80-190

[a] n indicates number of samples.
[b] Basis for PCB concentration: "_6" indicates sum of 6 congeners, whereas "_Ar1254+1260" indicates concentration as sum of all PCBs given by sum of Aroclor 1254 and Aroclor 1260. The range and/or mean±stdev concentrations are given as obtained from the respective reference. ND=not detected.

Table 103 An overview of distribution of PCBs in biological media (ng/g lipid) in Turkey.

Location	Survey year	n[a]	Sampling area	Bases[b]	PCBs[b] Amount	Location
Marine organism	Mersin Bay	1976-1981	109	Coastline	$\Sigma_{Ar1254/1260}$	0.4-77
Marine organism	Taşucu, Mersin	-	149	Coastline	Σ_{Ar1254}	ND-39
Fish species	Sinop, Yakakent	1993	14	Coastline	$\Sigma_{Kanechlor}$	130-3500
Fish species	İstanbul, Anamur	-	5	Coastline	Σ_6 Σ_6	169-652 90-914
Fish species	Kahramanmaraş	2003	80	Reservoir	Σ_{16}	ND-42.3[b]
Fish species	Marmara Sea	2003	12	Sea Water	Σ_7	63.3-509 ND-1.96
Marine biota	Mediterranean Sea	2002	36	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND-28.0 ND-10.1
Fish species	Mediterranean Sea	2003	15 sites	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND-9.45 ND-9.45
Fish species	Mediterranean Sea	2004	18 sites	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND-492 ND-419
Fish species	Mediterranean Sea	2005	10 sites	Coastline	Σ_{Ar1254} Σ_{Ar1260}	4.1-10.7 1.2-18.2
Fish species	Mediterranean Sea	2006	18 sites	Coastline	Σ_{Ar1254} Σ_{Ar1260}	83.4-268 1.12-23
Mussel	Izmir Bay	2004	6	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND-306 ND-99
Mussel	Izmir Bay	2005	6	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND-416 ND-340
Mussel	Izmir Bay	2006	9	Coastline	Σ_{Ar1254} Σ_{Ar1260}	8.91-70 1.94-12.1
Mussel	Izmir Bay	2007	9	Coastline	Σ_{Ar1254} Σ_{Ar1260}	ND-43.6 ND-10.4
Mussel	Izmir Bay	2008	9	Urban coastline	Σ_{Ar1254} Σ_{Ar1260}	5.4-31.4 4.3-11.7
Mussel	Izmir Bay	1999	8 sites	Industrial	$\Sigma_{\#16-\#209}$	4.9-28.1
Mussel	Mid Black Sea	1999-	6 sites	Industrial	$\Sigma_{Ar1254+1260}$	ND

		2000		coastline		
Mussel	Izmir Bay	2000	8 sites	Industrial	Σ_{209}	11.2-36.0[c]
Pellet	Izmir Bay	2003	1	Urban coastline	Σ_{13}	53[d]
Harbour Porpoise	Sinop Yakakent	1993	49	Coastline	$\Sigma_{Kanechlor}$	1600-39000[c]
Adipose tissue	Ankara	1966-1998	50	Human cadavers	Σ_{Ar1260}	ND-780
Adipose tissue	Ankara	1999-2000	29	Surgical operations	Σ_{7}	383
Adipose tissue	Ankara	2003-2005	45	Surgical operations erkek	Σ_{12}	19
Human milk	Ankara	1966-1998	50	-	Σ_{Ar1260}	ND
Human milk	Ankara	1999-2000	32	-	Σ_{7}	266
Human milk	Kahramanmaraş	2003	37	-	Σ_{8}	0.15-1.92[c]
Human milk	Ankara, İstanbul, Antalya, Kahramanmaraş, Afyon	2007	51	-	Σ_{6}	10.7-25.0

[a] n indicates number of samples or if information not found: number of sites

[b] Basis for PCB concentration: "**_18**" indicates sum of 18 congeners, "**_Ar1016**" indicates PCB concentration as Aroclor 1016, "**_Ar1016+1260**" indicates concentration as sum of all PCBs given by sum of Aroclor 1016 and Aroclor 1260, "**_Ar1016/1260**" indicates concentration as Aroclor 1016 or Aroclor1260 ,"_#16-#209" indicates sum of all congeners from IUPAC No. #16 to #209. The range and/or mean±stdev concentrations are given as obtained from the respective reference. ND=not detected.

[c] ng/g wet weight.

[d] ng/g pellet used as an alternative to biological media for monitoring.

Potential Risk Groups:

Regarding the references of the scientific studies done in Turkey we can say that there is no study that is including the entire of country. The majority of the studies are carried out in the following regions: Black Sea region, Çukurova region, South-eastern part of Anatolia, Marmara region, Central Anatolia(mainly Ankara, Kayseri, Konya, Sivas).

All the studies mentioned above revealed levels well below the accepted limits. There are some exceptions for PCBs, eg: soil samples collected from TEIAS Laboratory vicinity where PCB containing electrical transformer oils were exchanged[19]. Another example can be given from the Greenpeace analysis in Izaydaş[20].

[19] Yeniova M., Vural N., 1999, Biological and Environmental Monitoring of Polychlorinated biphenyl, PhD Thesis.

[20] Greenpeace 1998 update 2000 Reports, The Dark Site of Petkim, Greenpeace Research Lab., University of Exeter, UK Tolga Temuge, Greenpeace Mediterranean.

It can be concluded that there is no imminent risk for these populations. Since there are many regions where no studies have been performed as yet it is not possible to estimate whether the populations in these regions would be potential risk groups.

On the other hand these populations do not face new exposures to POPs chemicals. They will face no future risk.

In Turkey, the Ministry of Environment (MoEF) is the authorized body to establish standards and guidelines, to formulate policies, to develop cooperation with other ministries, to monitor the trends, to enforce the current legislation and to disseminate information related to the environment and is best suited for undertaking the key activities described in the project. MoE is also the POP focal point.

2.3.8 Current level of information, awareness and education among target groups; existing systems to communicate such information to the various groups; mechanism for information exchange with other Parties to the Convention

Turkey is one of the European Union Candidate Countries and public awareness is increasing about environmental issues, like in the other technical and social ones. Also, media sector informs the public on environmental problems, following destructive environmental accidents. After the privatization in Telecommunication sector, public participation, information exchange and access to information increased in Turkey. Internet pages of governmental institutions, NGOs and international foundations also performing successfuly for the accessing of information about environmental issues.

According to Turkey's environmental policy, the success depends on the fact that all sections of the population understand the functioning of the environment and the problems it presents. The implication of this is that environmental education should reach all sectors of the community. To this end, continous and detailed education programmes are being implemented at all levels of society so that every Turkish citizen becomes aware of the problem and fully assumes retponsibility in safeguarding the environment. In the formal system Environmental Education has been integrated into the curriculum of school in Turkey.

In the non-formal system, sustained efforts are being made to promote among policy makers to provide training for resource managers at appropriate levels, and promote greater public awareness and motivation for environment action. Some of these institutions and organizations are:

- Community based and none governmental organization
- Provincial services
- Media
- Religrous or faith based organizations
- Universities and Research Institutions
- Ministries and traditional institutions
- Schools

Toots and techniques for disseminating environment related informations are magazine newsletters, journals, brochures, radio/TV, posters, T-shirts and souvenirs are the some of the specific tools techniques are being used in Turkey.

2.3.9 Relevant activities of non-governmental stakeholders

In order to increase public awareness on POPs, only a few NGOs play small roles in Turkey. Greenpeace Mediterranean Office, Turkey publish some hand notes about international transport of POPs, source and global transport of POPs etc Kocaeli Chamber of Industry (KCI) today serves with its 1220 members and has 32 employees. In addition to duties determined by the Law, such as company registration, certification and advising to the government, the Chamber has been developed new projects and services for the benefit of both industry and society. The Chamber has been selected as a main contractor agency by UNEP for APELL (Awareness and Preparedness for Emergencies at Local Level) program in 1993. The Chamber has connected more than 70 critical companies to the main communication network, against effective environmental accidents since 1990. Media sector is very interested in environmental issues in Turkey; they prepare special environmental programmes on different subjects including POPs related subjects. This is a big advantage of Turkey for public awareness on hazards of POPs.

Because of the strict environmental controls and punishments in Turkey, waste exchange studies are increasing relatively fast in Turkey. In the last 5 years, a lot of stock exchange was structured in industrialized cities of Turkey such as Istanbul, Ankara, Bursa, Kocaeli, Adana and most of these exchanges are controlled by Chamber's of Industries in these cities. Although an increase is observed in operations, there are some problems, encountering for these exchanges, such as unregistered operations, incorrect information on waste or amount of waste.

Main NGOs that are related with POPs issues in Turkey are given in Table 104.

Table 104 Main NGOs related with POPs in Turkey

Name	POPs Interest	Address
Kocaeli Chambers of Industry	Waste and hazardous waste management	Kocaeli Chambers of Industry-Kocaeli www.kosano.org.tr
Istanbul Chambers of Industry	Waste and hazardous waste management	Istanbul Chambers of Industry-Istanbul www.iso.org.tr
Ankara Chambers of Industry	Waste and hazardous waste management	Ankara Chambers of Industry-Ankara www.aso.org.tr
Buğday Ecological Life Services	General Pollution	Kalçın Sok. No:15 Kitapçı Han Kat:2 Eminönü İSTANBUL www.bugday.org
Greenpeace Türkiye	General	MBE 105-109 Salıpazarı 80040 İSTANBUL www.greenpeacemed.org.mt
TV Channels (TRT2, Discovery Turkey, NTV, CNN Turk etc..)	General	www.trt.net.tr www.ntv.com.tr

2.3.10 Overview of technical infrastructure for POPs assessment, measurement, analysis, alternatives and prevention measures, management, research and development - linkage to international programs and projects

There is no corresponding Turkish legislation for Directive 2000/ 60/ EC under the EU water management. Implementation of subjects covered by the aforementioned directive is under the authority and responsibility of various administrative institutions, therefore, a MATRA project, "Implementation of the Water Framework Directive in Turkey" has been conducted and its outputs has been put into force. The project has identified how the current administrative structure needs to be transformed, in order to implement Directive 2000/ 60/ EC. Following the completion of the MATRA project, another project which is about training of central and provincial units on the alignment and implementation of Directive 2000/ 60/ EC, strengthening of the administrative structures, and investment needs for implementation purposes, has been proposed to the Pre- accession Financial Assistance Program.

By the Project "Capacity Building Support to the Water Sector in Turkey" institutional and legislative gap analysis and a management plan for Büyük Menderes River Basin were carried out. These river basin management plans include characteristics of the basin, pressures and impacts, measures to be taken and targets, protected areas, inclusion of the parts in the process and cost effective analysis of the measures to be taken. In addition, two draft National Implemantation Plans were prepared for Water Framework Directive (2000/60) and Dangerous Substances Directive (2006/11/EC) These plans will be the road map for the implemantation of these directives.

As a result of this Twinning Project, 7 steps which should be followed on the draft national implemantation plan for Dangerous Substances Directive (2006/11/EC) were defined. Although the dates given in the Strategy Document were taken into account for the steps given below, the indicative dates will be determined later. The 7 steps and times:

- Licensing and enforcement (2014)
- Legal framework (2010)
- Determination of the substance concerning Turkey (2012)
- Monitoring/ sampling programme (2012)
- Development of Environmental quality standarts for the sunstances in List II (2012)
- Pollution Reduction Programmes (2014)

- Progress reporting and monitoring (dependent on EU membership)

In Turkey there are two by-laws related with discharge of certain dangerous substances in to the aquatic environment "By-law on Water Pollution Control" and "By-law on the Control of Pollution Caused by Dangerous Substances Discharged into the Aquatic Environment". The By-law on the Control of Pollution Caused by Dangerous Substances Discharged into the Aquatic Environment published in Official Gazette No: 26005 dated on 26 November 2005 is agreed with corresponding 2006/11/EC Directive and it regulates some obligations about the pollution caused by certain dangerous substances discharged into the aquatic environment. Within the scope of the project on "The Capacity Building Support to Turkey for the Water Sector (TR.0603.04) " draft implementation plan was prepared and "The By-law on the Control of Pollution Caused by Dangerous Substances Discharged into the Aquatic Environment" was revised.It will have been finished by the end of 2010. Within the scope of the revision of the by-law in which environmental quality standards and discharge limits for most of the dangerous substances listed, the amendments in EU Directive, the steps in National Draft Plan will be represented. Via a national project foreseen to be initiated in 2010, monitoring studies will be started in pilot basins selected in Turkey and such information about industrial plants discharging dangerous substances including POPs, their discharge amounts and their concentration in receiving bodies will be collected within an inventory.
The By-law on the Control of Soil Pollution, which has been put into force with Official Gazette No: 25831 dated on 31.05.2005, has been revised and the By-law on Control of Soil Pollution and Contaminated Sites with Point Sources was put into force with 08.06.2010 date and Official Gazete No:27605. The provisions in the former by-law for the use of stabilized treatment sludges in soil has been gathered in the By-Law on the Use of Domestic and Municipal Treatment Sludges in Soil. At this stage in whole country, there are 5 plants has permissions for the use of treatment sludges in soil.

Although existing Turkish legislation is, to a large extent, harmonized with relevant EU legislation, studies have been initiated to prepare draft regulations and proposals for amendments in order to fully complete alignment with the EU directives listed below. Turkey's major problems related to waste management are the elimination of hazardous waste from industry, and the combination of industrial and domestic waste, domestic waste, specific waste, and construction waste all together, without separate collection. However, in the framework of regulations prepared by the Ministry of Environment and Forestry, the metropolis in particular initiated integrated solid waste management studies, and collection and elimination of waste following categorization is being realized to a certain extent. In Turkey, there are plants for the elimination of hazardous and domestic waste, albeit few in number.

Implementing Regulation on Hazardous Waste Control published in the Official Gazette No. 25883 on 14 March 2005, corresponds to, definitions and provisions of Council Directive 75/ 442/ EEC on waste. However, provisions relating to waste management principles are not clear and there is a need to strengthen provisions regarding record keeping, monitoring and enforcement. The legislation on the Hazardous Waste Management financed out of the national budget, harmonization strategies are being prepared.

Turkey has been a party to the Basel Convention, since 1994. Provisions of the convention are strictly implemented within the scope of the Implementing Regulation on Hazardous Waste Control. In the accession process, preparation of separate implementing regulation concerning the shipment of waste is envisaged.

Industrial pollution and risk management are assigned as priorities, considering that beginning to transpose and implement the *acquis* is a short term priority, and completing the transposition of the *acquis* is a medium term priority in the 2003 Accession Partnership Document.

The project entitled "Institutional strengthening for the adoption and implementation of integrated pollution prevention and control directive (IPPC - 96/ 61/ EC)", supported by the bilateral cooperation with the Government of Netherlands, MATRA Program, was initiated in 2003. The programme concentrates on supporting the transition toward pluriform, democratic constitutional states in the Central and Eastern European countries. A number of these countries acceded to the European Union in May 2004.,. In July 2000, the Government of the Netherlands decided to include Turkey in the list of countries that can make use of the MATRA Programme. This decision had been taken in view of the decision by the European Council of December 1999 in Helsinki on Turkey's candidature for membership of the European Union.

In addition, the Support to Turkey in the Field of Air Quality, Chemicals and Waste Management Project (TR- 362.03), which has been submitted to the 2003 Pre- accession Financial Assistance Program, involves strengthening administrative capacity for harmonizing and implementing Directive 2001/ 80/ EC of the European Parliament and of the Council of 23 October 2001 on the limitation of emissions of certain pollutants into the air from large combustion plants.

Approximation of Seveso II Directive in Turkey Project had been implemented between 2004-2006f or harmonizing the "Council Directive 96/82/EC on the Control of Major-Accident Hazards Involving Dangerous Substances" (Seveso II)to Turkey's. As an outcome of the Project, "By-law on Control of Major Industrial Accidents" was published in the Official Gazzette dated August 18, 2010 and numbered 27676. Guidance documents on Safety Raport and Emergency Situation Planning, notification and Informing the Public and Inspection communique is under construction. In addition, a Project proposal titled "Implementation Capacity for Seveso II" has been submitted under the IPA 1. Component 2009 and approved. This Project aims to strengthen the institutional and administrative capacity of central and local authorities responsible for implementation of Seveso-II Directive

For the harmonization and implementation of Directives on industrial pollution and risk management, particularly integrated pollution prevention control and the limitation of emissions of certain pollutants into the air from large combustion plants, heavy cost investments and strengthening technical capacity are required.

For the implementation of legislation under this priority, transition periods will be required depending on whether the investment needs are met. For this purpose, initially the project ''Capacity Building (Human Resources Aspect) on the adoption of Integrated Pollution Prevention and Control Directive (IPPC-96/61/EC)" started in 2003.This project was financed by the Dutch Government (MATRA-PSO) in 2003-2004 and targeted at training and a legal and institutional analysis required for establishing a future IPPC implementation structure "IPPC implementation in Turkey". There was another project also financed by the Dutch Government (MATRA-PSO) in 2006-2007 targeted at the establishment of an action plan (including road map) for IPPC implementation in Turkey and a training programme on IPPC

permitting at selected IPPC pilot plants. Within the framework of this project a Strategy Development Team was established and three working groups consisting of Turkish stakeholders from other line Ministries and the industrial sector and NGOs.
Regarding the Voluntary Regulation Mechanisms on Cleaner Production Issues, there is a Responsible Care program run by the Turkish Chemical Manufacturer's Association to promote the voluntary adoption of Cleaner Production criteria in which almost all the chemical manufacturing plants in Turkey are participating. Istanbul Chamber of Industry and the Chemical Manufacturer's Association are acting together on environmental affairs.

There are some important approved and ongoing research projects performed in Turkey by governmental research centers and universities. POPs related projects are listed in Table 105.

Table 105 POPs related projects in Turkey

Project Name	Year(s)	POPs Relation	Institution
POPs residues in selected environment (water, soil, air) and biota in Turkey	2002-		
Dioxin Emissions in Candidate Countries (EU DG Environment Funded Project)	2003-2004	Dioxin/Furan	TUBITAK-MRC (Partner)
Development of a risk screening system for contaminated sites (National)	2003-	General POPs relation	Middle East Tech. Univ.
Soil remediation using solid and slurry-phase reactors (National)	2002-	General POPs relation	Middle East Tech. Univ.
Determinations of some organophosphorus pesticides in wheat and wheat products (National)	2004-	Pesticides	MARA, Plant Protection Central Research Institute
Investigation of some pesticides are used tomatoes production in greenhouses in Ege Region and extraction methodologies (National Project)	2004-		MARA Bornova Plant Protection Research Institution
Reduction of pesticide residues in environment and processed products (NATO Project)	2002-		MARA Bornova Plant Protection Research Institution
Determination of pesticide pollution in Istanbul Drinking Water Resources	2001	Pesticide	Istanbul Technical University
Some Organochlorine Pesticide Residues and Their Toxic Effects on Waterbirds in Göksu Delta	1991-1993	Pesticide	Hacettepe University, Dep. Of Biology
Determination of organochlorine pesticide pollution in Manyas Lake	1998	Pesticide	Hacettepe University, Dep. Of Biology
Study on accumulation of pollutants in the environment and organisms and effect to fish in Sakarya Basin, Türkiye	1996-1999	Pesticide	Hacettepe University, Dep. Of Biology
The Project on Development of Management System for Contaminated Sites by Point Sources	2006-2009	General POPs relation	TUBİTAK, Middle East Tech. Univ.(Department of Environmental Engineering) as implementer, MoEF as beneficiary

A situational analysis was conducted on the monitoring, research and development capacity of the various institutions in the fields of:

- Environmental chemistry and fading of POPs
- Socio-economic and cultural impacts of POPs
- Effects of POPs and measuriments on human helalth and environment

It because clear from the country analysis that the chemical effects of POPs on economic, social and helath activities are known. What is difficult to assess however, is the institutional capacity to deal with the problems that may arise in terms of monitoring research and development of humans materials resources and environment.

The institutions which is operational in Turkey have the potential to develop and to meet the challenges identified. Accept this institutions all have similar and basic problems including lach of facilities to take additional courses, research fellows and intrastructure to accormadate the research and development as well as monitoring activities. In addition the contaminated site recmediation capability, information management capacity and waste management facilities require extensive support and technical and financial aids in Turkey.

2.3.11 Identification of Impacted Populations or Environments, Estimated Scale and Magnitude of Threats to Public Health and Environmental Quality and Social Implications for Workers and Local Communities

Declaration and Reporting of Priority Pollutant Releases:

DDT was the most commonly used POPs chemical. Therefore it ranks first in the priority list. Aldrin, dieldrin and endrin together formed the second biggest group of POPs chemicals that have been analyzed.

Hexachlorohexanee is also one of the most widely used POPs pesticide in Turkey. It can be said it takes the third position.

Current Monitoring Standards and Capacity for POPs:

There is no previously performed or currently ongoing monitoring study for POPs in Turkey. In Refik Saydam Hygiene Center, the laboratories of Poison Research Directorate are fully equipped and suitable for carrying out monitoring the POPs. Already, drinking waters are being analyzed in these laboratories for PCBs on a routine basis. The only drawback is that the laboratory is not accredited as yet. However, actually meet the proficiency test and SOP (Standard Seperating Procedure) requirements it is in the stage of ameliorating laboratory conditions.

Since there are no monitoring studies, it is impossible to assess the weaknesses or to compare the practices with the obligations of the Convention.

Current Occupational Safety Measures of POPs Pesticides and PCBs:

The POPs chemicals have long been banned in Turkey and since they are no longer in use, there are some occupational safety measures for these chemicals.

For the period in which POPs chemicals were used in the country, the ILO guidelines for occupational some safety measures were taken into consideration.

Potential Risk Groups

The scientific studies carried out up to date were not done as a systematic monitoring study but were carried out on individual level as masters and doctorate theses and as Project studies. There is a serious need for global monitoring studies to be carried out throughout the country to assess the actual levels and those where no previous analyses were performed.

It has to be noted that the people living in the regions where wet agriculture is done may be the potentially risk group. Monitoring studies must be performed especially in Sakarya river and South-eastern Anatolia regions.

General Assessments

In Turkey, OCPs were started being used against pests in 1945, large quantities of these chemicals were used during the 1960s and 1970s, and since 1983 usage of these chemicals have been severly restricted.

Endosulphan derivatives were put in use instead,which are not as persistent as OCPs and have metabolites less toxic than OCPs.

DDT and its metabolites, HCH and its isomers, aldrin, dieldrin and endrin derivatives are not in use anymore but they are still detected in sediment, human milk and adipose tissues. However, there is a clear decrease in residue levels in recent years. This indicates that these OCPs have completed their biological half-life.

Furthermore, there is the possibility of illegal trading and use of DDT in Southeastern Turkey, especially in the Syrian and Iraq borders where illegal pesticides traffic is suspected because of impared border security since the Gulf War. For this the reason high level of DDT be expected in this region.

The Sakarya River is the most important source for almost all of the organochlorinated pesticides, because the Sakarya River lies to the western part of the Black Sea and its drainage area includes fertile plains in the north western Turkey. The Sakarya River is followed by the Kızılırmak and Yeşilırmak Rivers, both of which have high flow but are located on the eastern Black Sea coast and their drainage area includes regions in the Central Anatolia where agriculture is not as extensive as in the north western part of the Turkey.

In Turkey, OCP residues have been monitored in breast milk and adipose tissue in Turkish populations by carrying out regional surveys at given time intervals since 1976.,

Heptachlor epoxide was clearly detected in some samples (17.82%) . The presence of heptachlor epoxide in different regions of Turkey including Ankara have been reported earlier

(Burgaz et al., 1994; Çok et al., 1998). The level of heptachlor epoxide in human adipose tissue samples of Ankara residents has been reported as 0.021 ppm by Burgaz et al., 1994. In a later study, (Çok. et al., 2002) the amount of heptachlor epoxide was found to be 0.06 ppm which is significantly different than the previous one ($p<0.05$). The heptachlor epoxide levels in human body might have originated from heptachlor as an oxidation product, given that it was used as a pesticide in Turkey until 1985.

HCB is a widespread contaminant that has entered the environment through its past manufacture and use as a pesticide and its formation as a by-product during the production of a variety of chlorinated compounds. Average HCB residue levels in adipose tissue of Ankara residents have been reported as 0.164 ppm (Burgaz et al., 1994). In a late study, the level of HCB was found as 0.152 ppm (Çok. et al., 2002). Indeed, HCB is the most striking one among the OCPs that have been analysed. The values tend to be consistent over the years, even though expected to decrease. Concentration of HCB was found to be lower in other parts of Turkey (Çok et al., 1998; Çok et al., 1999). The presence of HCB in human milk can be attributed to various activities and other pesticides (PCNB, PCP, DCPA etc). Although the agricultural usage of pesticides and industrial activities such as waste by-products in specific manufacturing processes have created considerable amounts of HCB impurities. The need for more comprehensive studies on the causes and sources of HCB exposure, is indicated by this research.

Experimental and epidemiological studies show that DDE/DDT ratio increases with time after exposure or after the limitation or restriction of DDT usage. In a late study, (Çok. et al., 2002) DDE/DDT ratio was found as 17.67 which was quite higher than that obtained in the 1987 study by Karakaya et al. which was 4.50 ($p<0.001$). On the other hand, in the studies that have been performed on adipose tissue samples, this value was calculated as 3.19 an 1976 (Kayaalp et al., 1979), 9.4 an 1984 (Karakaya & Özalp 1987) and 13.53 in 1991 (Burgaz et al., 1994). When we consider DDE/DDT ratios, it is seen that the limitation and legislation for OCPs in Turkey has been effective and the exposure to these compounds tends to decrease in time.

Although the majority of organochlorine pesticides have not been used in Turkey for a long time, the residues of organochlorine pesticides are being observed in food, especially in cereals, fatty meat and milk products on the grounds that these pesticides have a persistent character to prevail in the environment for a long time without spoilage.

The amount of organochlorine pesticide residues existed in the samples (butter and cracked wheat) were determined and no organochlorine pesticide residues were traced in the butter samples while PCNB and lindane has been traced in the samples of cracked wheat and also pp'-DDT, pp'-DDE residues has been traced in few samples.

Sardines, sardelles, and pelamide are the canned fish. These fish are caught in The Black Sea and The Sea of Marmara, except the trout. The residues of organochlorine pesticides are examined on meat and fatty parts of these fish.

According to Turkish codex the limit values for organochlorine pesticides and OCPs for canned fish and the exported ones are below 0,0005 mg/kg for fat and below 0.0001 mg/kg for meat. The residue values found in the study was ¼ of the limit values in codex.

It is demonstrated that the analyzed fish species, prior to being processed and canned and brought to the market, contained particularly unmistakable amounts of the above mentioned analytes. Sardines, sardelles and trout gave results generally far below the German regulatory limits. However total DDT in pelamides reached an order of magnitude near the German limit of 0.5 mg/kg (based on wet weight).

The OCP residue studies carried out in human milk and adipose tissue were restricted to a limited number of areas of the country, namely. Ankara, Sivas, Adana, Kayseri, Kocaeli and Kahramanmaraş. Since Turkey is an agricultural country with vast agricultural lands, more studies need to be performed to make more accurate assessments for the entire of the country.

Besides OCP residue analysis, the assessment of the toxic effects of OCPs in aquatic and terrestrial organisms including humans need to be performed on a much bigger scale.

Soil and sediment studies up to day are very few and insufficient in number. In addition, transfer from soil to vegetation is another relevant area for further studies.

A review of the extent of exposure of the human population and environment in Turkey to POPs was carried out. The inventory covered the extent to which POPs is not an issue in Turkey. However, encouragement of research and monitoring in grey areas, training of specialists, conducting of studies on health effects of the public. Priority areas that need urgent attention include the following:

- Training of specialist in clinical toxicology to strengthen poisoing management in health institutions and poison centers
- A well equipped national accredited laboratories which can analyse and dedect samples to the minutes detail possible accept table internationally.

2.3.12 Details of any relevant system for the assessment and listing of new chemicals (Existing regulatory schemes for assessing new chemicals)

Pesticides and industrial chemicals have different registration procedures in Turkey.

The registration procedure of agricultural pesticides is given in the Regulation for the Registration of Pesticides and Similar Substances of Ministry of Agriculture and Rural Affairs (MARA) published in the Official Gazette no: 23614 on 17 Feb. 1999. The registration procedures start with a written application of persons to MARA. The applicant firm has to employ an expert responsible from registration and to submit the relevant documents concerning employees, the plan of production plant and specifications of pesticide products. Registration is executed through formulations of pesticides. Producers have the right for temporary production of pesticides to test them for biological efficiency. For the test production, permission has to be taken from MARA. To apply for the registration related application forms are submitted to MARA and an intra-ministerial commission evaluates these documents. MARA has the right to analyze the pesticide products that are subject to registration before marketing.

The consumer pesticides are registered by Ministry of Health (MOH) in line with the Directive Dimensioning the Special Characteristics of Things and Substances Related to Foodstuffs and General Health published in Official Gazette no:8236 on 18th October,1952 and a Ministerial Circular for the registration of consumer pesticides (insecticides,

rodenticides and mollucides). The registration procedure is very much like the one for pesticide registrations of MARA. A new regulation is needed to clarify the official registration procedure concerning consumer pesticides and this new regulation is planned to be put into force by MOH in 2006.

Chemicals that are hazardous, dangerous, or toxic for the environment and human beings or animals are registered according to the By-Law on Classification, Packaging and Labelling of Dangerous Substances and Preparations (Official Gazette no:27092 dated 26 December 2010) By-Law on Inventory and Control of Chemicals (Official Gazette no:27092 26 December 2010 and its amendent Official Gazette no:27402 dated 10 November 2009) By-Law on Compilation and Distrubition of Material Data Sheets (Official Gazette no: 27092 dated 26 December 2010), By-Law on Restrictions on the Manufacturing, Marketing and Use of Certain Dangerous Substances, Preparations and Articles (Official Gazette no: 27092 dated 26 December 2010) of the Ministry of Environment and Forestry (MOEF) In the frame of theseby-laws; the detailed information of producers, identification of produced chemicals, the production, imports, and use data of these chemicals (including the predicted data of production and use), chemical, physical, and ecological properties, and means of disposal have to be submitted to MOEF.

Pesticides, consumer chemicals and toxic and hazardous substances are either banned or under control by regulation in Turkey. However, these substances are not sufficiently monitored by the related institutions. Unregistered use of some chemicals can be possible via smuggling from neighbor countries. Industrial chemical producers and their chemicals are not registered by responsible ministries. The data of production and sales are collected by SIS, and the Undersecretariat of Foreign Trade monitors foreign trade. The lack of good monitoring practices and insufficient research are handicaps preventing assessment and listing of new chemicals.

Pesticides and other hazardous chemicals are controlled in Turkey by regulations. For example, POPs pesticides are banned in Turkey, as detailed in the previous chapter. Directive concerning the method and principles of registration of pesticides and similar products used in plant protection dated 1999 is directly related with the control of pesticides. This directive is managed by MARA, so plant protection products that contain some active ingredients are controlled and inspected by MARA. Regulation for the toxic chemicals and their products (1993) is also related with the control of the current chemicals. MoEF manage this regulation, but for assessment and listing of new chemicals is not sufficiently performed as for today in Turkey. The new training program should be started for development of a relevant systems for the assessment and listing of new chemicals.

As explained above these are existing procedures for the assessment of new pesticides to be registered in Turkey (Article 3 and Annex D).

In brief, Article 3 and Annex D of the Stockholm Convention specifies information, requirements and screening criteria for listing a new chemical are:

- Chemical identify
- Persistence
- Bio-accumulation
- Potential for long-range environmental transport; and
- Adverse effects on environment and human health

2.3.13 Details of any relevant system for the assessment and regulation of chemicals already in the market (Existing regulatory schemes for assessing chemicals already in the market)

The pesticides in the market are inspected according to the Regulation for the Control of the Pesticides published in Official Gazette no: 22321 on 22 June 1995. Inspections are conducted concerning product, label, factory, market, process, and complaints of consumers. During the controls, the specifications of the product, its effects on the plant at recommended use, its effect on disease, insect, and weed at recommended use are inspected or analyzed in the authorized laboratories. The inspections are executed by regional offices of MARA. The evaluation and analysis reports are sent to the central office.

The consumer chemicals that are already in the market are inspected by MOH. Market inspections are conducted non-systematically but generally based on complaints of consumers. The inspection procedures are not transparent. This problem is supposed to be solved by the above mentioned new regulation.

The placing on the market of a dangerous preparation in Turkey requires notification of the Ministry of Environment and Foresty, the Ministry of Agriculture and Rural Affairs and the Ministry of Health. The information submitted at least on the day of its placing on the market includes the identify of the firm placing it on the market, trade name of the dangerous preparation and its safety data sheet or other data to obtain permission (Article 3 and Annex D).

The placing on the market of a dangerous preparation in Turkey requires notification of the Ministry of Environment and Foresty, the Ministry of Agriculture and Rural Affairs and the Ministry of Health. The information submitted at least on the day of its placing on the market includes: the identify of the firm placing it on the market, trade name of the dangerous preparation and its safety data sheet or other data to obtain permission (Article 3 and Annex D).

A person dealing with the trade, production, packaging and labeling, storage, transports of dangerous chemicals are inspected by MOEF according to the provisions of the Regulation for Dangerous Chemicals. Inspections led by MOEF officials are executed via random sample collection from the market or directly from producers. The specifications of products and information given on the label are checked for the accordance with the provisions of mentioned Regulation and with the registration of producers filed in MOEF. Samples are collected in accordance with the related standards of Turkish Standards Institute. Imports of these chemicals are put under control by annual Communiqué of Standardization for Foreign Trade and importers are obligated to receive a Control Certificate issued by MOEF. However, the inspection system of industrial chemicals should be designed to work efficiently by MOEF.

3.0 Strategy and action plan elements of the national implementation plan

3.1 Policy statement

The NIP includes activities are resulting from the provisions of the Stockholm Convention, the European Community legislation and the Turkish Law.

Over the past decade, a wide range of Acts and Directives have led directly or indirectly to a reduction of releases of POPs into the environment, to an objective decrease of their levels in food products and in the human population, resulting in significant advances in the protection of the public health and the environment. Recent exposure data show that measures introduced to control POP release have resulted in a substantial reduction of the intake of these compounds: levels in humans have been decreasing since the beginning of the nineties.

Policy statement would be endorsed by the inventories, measure discussed in details in the NIP understood and approved. In addition it would be endorsed by the Government or by all the stakeholder ministries. The endorsement letters would be attached to the NIP as an Annex.

As of 2006, The Policy Declaration and the inventories have ben approved by the stakeholders, as well approval and adoption by all stakeholder ministries of the measures specified in detail at the National Implementation Plan.

Turkey participated in the United Nations Conference on Environment and Development (UNCED) held in Rio de Janerio, Brazil in 1992. At this Conference, Heads of States of Governments adapted "Agenda 21" a document that seeks, among other things, to enhance sound management of chemicals. The document, outlined responsibilities of every nation towards the collective achievement of sustainable development.

Under "Agenda 21" which deals with environmentally sound a management of chemicals, including illegal international traffic in toxic and dangerous products.

- Information exchange on toxic chemicals and chemical risks,
- Harmonisation of classification and labeling of chemicals,
- Expanding and accelerating international assessment of chemical risks,
- Establishment of risk reduction programmes,
- Prevention of illegal international traffic in toxic and dangerous products,
- Strengthening national capabilities and capabilities for the management of chemicals.

POPs fall under the category of potentially toxic chemicals, Turkey is committed to the effective implementation of the provisions and obligations of the Stockholm Convention on POPs. This is clearly demonstrated through the signing early adaptation and finally submitting of the Convention to the Turkish Parliament for ratification by the Government of Turkey. The Ministry of Environment and Forestry is expected to play a leading role in promoting safe management and use of chemicals, including POPs for industrial, agricultural, public health and consumer uses in order to avoid damage to human health, the ecosystems and the environment in general in ensuring sustainable development.

The process of the development of the NIP involved the active participation of broad-base relevant national stakeholders, including the .Ministries, departments and agencies, institutions, NGO's, media they are all commented and endorsed by the national stakeholders (see Annex 1).

Endorsement of NIP is the process of the development involved the active participation of broad-base relevant national stakeholders, including government ministries, departments and agencies, research institution, non-governmental organizations, community based organizations and the media. The NIP has been commented and endorsed by the national stakeholders.

Under these, Turkish Government is expected to develop actions and priorities relating to:

An initial assessment of resources and budgetary estimates needed for the successful and effective implementation of the NIP have been identified. At the National Stakeholders Meetings Final Review Workshop, a framework for the developing priority projects for the NIP was pointed out. This framework will take into consideration and identify specific human resources, stakeholder contribution and requirements for possible GEF, World Bank or other organization incremental costs and fundings by donor partners. The resources requirements are the essential and successful and effective implementation of the identified tasks, commitments and activities for the implementation plan for Turkey.

Nevertheless, many unsolved POP problems still exist and all these problems that are given in the listed National Priority Validation areas. This describes the policy and objectives of the NIP.

The main strategy objectives of the NIP are in brief:

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

- Liquidation of old loads connected with POPs

- Application of BAT/BEP (Best Available Techniques/Best Environmental Practices) principles as basic principles in a future industrial development strategy

- Gathering additional data necessary for objective evaluation of the load of these substances on selected areas

- Optimizing monitoring programmes between individual ministries with the goal of realizing tasks associated with the implementation of the Stockholm Convention

In Turkey some POPs pesticides were regulated and for these chemicals a trend towards decreasing POP emissions into the environment and humans can be observed.

PCDD/F emissions were not addressed in the past in Turkey and only during recent years the first measurements in the cement industry and a few metal industries have been performed.

For the preparation of the NIP, the following facts would be significant:.

- Turkey already has a significant current release of PCDD/PCDF emission (2162 g TEQ/year). The metal industry having the highest inventoried PCDD/PCDF emissions in Turkey is a booming industry and plan to increase capacity. In addition Turkey having very limited incineration capacity plans the construction of a range of incinerators and it can be expected that a considerable share of waste which is currently sent to landfills might be diverted towards incineration or thermal recycling in future. Therefore emissions from Annex II sources can be expected to increase in Turkey in future and PCDD/F emission would increase if not appropriate BAT/BEP strategies will be developed and implemented.

• Based on the fact that a huge amount of PCBs materials containing PCBs and PCB containing equipment will necessitate destruction in the coming years, it will be imperative to resolve the question concerning an environmentally sound manner for their destruction, and prevent and possible environmental contamination and human exposure.

• In briefly stating, Turkey signed the Stockholm Convention and its ratification is in progress. In reference to the country's status for the POPs issue and the NIP within the overall national policy and legislative framework relation to environmental protection, sustainable development and public health would be included.

3.2 Implementation strategy

This subchapter would detail the actions included in the NIP to meet the obligations of the Stockholm Convention and would outline a framework mechanism to coordinate discrete NIP activities including review, reporting, evaluation and updating of the NIP (Table 106).

Table 106 Implementation strategy development and capacity building proposal and priorities

Implementation strategy development and capacity building proposal and priorities	Responsible*
• To officially establish a National Task Team for the National Intersectoral coordination among all relevant stakeholders.	MoEF
• To authorize currently established team of POPs expert evaluation of projects, and evaluation of environmental measures regarding Turkish and EU legislation in a given field and to change current practices of accepting basic political and economic measures.	MoEF
• Certain types of waste containing PCB may be liquidated in cement factories.	MoEF
• The liquidation of wastes containing POPs.	MoEF, MoA,
• To insure sufficient technological capacity for he removal of remained of PCBs and waste contaminated by POPs (especially PCBs) and contaminated soils and sediments.	MoEF, MoI, Owners of PCB and PCB including equipman
• Identification and assessment of the effects posed by POPs to human health and environment. During this assessment internationally recognized criteria, standards and limits will be adapted.	MoEF, MoH, MoA
• Research on alternative chemicals will be vigorously persued.	MoEF, MoH, MoA, MENRO
• Reviewing reporting, evaluation and updating of NIP will be continued.	MoEF, MoH, MoA, MENRO
• The commitments will be obtained from the national stakeholder.	MoEF

* See Abbreviations, the first Ministry or Institution is the responsible

As indicated in the footnote of Table 106 the first ministry or institution is the responsible and coordinator for the implementation of the NIP. The required funds are given in each Table 3.3 . During the implementation each responsible ministry or institution will decide together with the other ministries and institution on the cost of each action plan.

3.2.1 Implementation Principle

This subchapter would give details of the implementation of the NIP that would outline its mechanism an general frameworks including evaluation reporting an updating.

During the implementation of the NIP measures, the following principles will strongly be promoted:

- **Public involvement**. An effective implementation of the Stockholm Convention on POPs is the national intersectoral coordination. This is a coordinated approach adapted with the cooperation among all public and relevant stakeholders at all levels with responsibilities related to chemicals management as well as those involved in activities that influence chemical safety including representatives of industry, labour and public interest groups such as representatives of NGO groups.

- **Adherence to Internationally recognized criteria, standards and limits** will be adapted during the assessments.

- **Compliance with BEP/BAT guidelines.**

- On the alternative chemicals, research in to **alternative chemicals to POPs** will be vigorously persued.

- **General consensus** on the actions through commitment from the national stakeholders.

- **Timely implementation** to avoid the need for specific exemptions.

- **Compliance with the National Environmental policy and long-term strategy for sustainable development**.

- Seeking **economic efficiency** of proposed actions,

- Taking into **consideration the actual economic situation of enterprises**,

- **Compliance with the legislation of the EC**,

- Training needs and capacity building for implemtation of BAT/BEP

- **Providing information to the public** and

There are many unsolved POP problems still exist especially on the emissions inventory, the emissions of PCDDs/Fs per capita and km^2 of country are still need examination possibly improvement. This means that the Turkey needs improvement also for the EU standards. In general, directly and indirectly reduction of releases of POPs into the environment, in the levels in food products, in human population and in the protection of public health are the main objectives. Therefore, the main strategy and objective of the NIP are given below:

The placing on the market of a dangerous preparation in Turkey requires notification of the Ministry of Environment and Foresty, the Ministry of Agriculture and Rural Affairs and the Ministry of Health. The information submitted at least on the day of its placing on the market

includes the identify of the firm placing it on the market, trade name of the dangerous preparation and its safety data sheet or other data to obtain permission (Article 3 and Annex D).

3.2.2 National Priority Validation Areas

Seven main priority areas of concern have been identified as follow:

- Reduction of releases of intentionally and unintentionally produced POPs
- Capacity building in the regulating and permitting governmental sector and also in private sector (e.g. POPs management, BAT/BEP implementation)
- Public education and awareness raising
- Public health and environment, monitoring and control
- Legislation including regulation and enforcement
- Information exchange and networking and
- Research into the extend of exposure of the population to POPs and the research for safer alternatives

During the third phase of the POPs project which was concluded with the National Validation Workshop, the national priorities and objectives were identified and approved by all participants and the POPs Turkish National Coordination Committee. These priorities and objectives were developed on the basis of the draft POPs inventories obtained at the second phase of project.

1. Stockholm Convention on POPs and implementation strategy

As indicated in the Executive Summary of the NIP within the Stockholm Convention, twelve POPs defined into three groups. These are:

- Pesticides
- PCBs
- Unintentionally produced POPs (PCDD, PCDF, HCB, PCBs). These have been reflected on the National Priorities and given the progress of their management until the updating of the NIP.

Reduction of immediate environmental and human health risks of the obsolete stocks and contaminated locations are the priorities.

The reduction of dioxin and furan releases through the introduction of BAT and BEP in industry sectors identified as main sources of UP-POPs in Turkey is a priority. The potential main source for the emission of dioxin and furan releases in Turkey are summarized in the Turkish Dioxin inventory. In this inventory estimate shows the main sources are ferrous and non-ferrous metal production, waste incineration, mineral production and power generation and heating. The total emission was 2162 g TEQ/year in 2006.

As indicated in the Executive Summary, obsolete stocks of the pesticides; 2700 tones of HCH in Kocaeli is under progress to ship abroad (export), 150 tones POPs, illegally dumped at the coastal zone of the Black Sea between Sinop and Samsun have been sent aboard for disposal

and 10.930 kg of DDT stockpiled at storage facilities of MARA near Ankara left over and waiting disposal. Therefore, pesticides disposal can be considered is not priority.

In the case of PCBs, as the result of regulation being published in the Official Gazette No. 267395 dated December 27, 2007 the detailed inventories of the PCB and the PCBs containing equipment shall be completed..

The overall objective of sound management of POPs in Turkey is firstly to strengthen the national capacity and capability to deliver a comprehensive assessment of the threats posed by POPs to human health and environment. It also seeks to reduce and ultimately eliminate POPs from the environment as envisaged under the Stockholm Convention on POPs.

In addition, under Stockholm Convention on POPs, Parties shall promote in some cases require in others the use of the Best Available Techniques (BAT) and promote the application of Best Environmental Practices (BEP), BAT means the most effective and advanced stage in the development of activities and their methods of operation which indicate the practical suitability of particular techniques. BEP means the application of the most appropriate combination of environmental control measures and strategies. The NIP is an integral part of national integrated chemical management program.

2. Activities strategies and action plan

The National Profile for chemicals management has been updated to include issues on the Stockholm Convention on POPs. Activities, strategies and action plans have been prepared to implement the country obligations under the Stockholm Convention. Specific targets, milestones and performance indicators are outlined to allow progress of implementation to be reviewed and monitored.

3. Development and capacity building priorities and target implementations

Project proposals to operationalize the National Implementation Plan have been prepared. The overall goal of the projects is to improve the management of risks to human health and environment from POPs. The Specific Project and their respective objectives are summarized below. The main proposals and priorities are as follows:

- Strengthen human and institutional capacity for the management of POPs.
    - Develop guidelines for the safe and environmentally sound production, usage, transportation, storage, handling and disposal of POPs and POPs containing equipment,
    - Develop policy for the management and control of POPs
    - Develop capacities in relevant institutions for the management of POPs, and
    - Promote coordination of activities of relevant institutions on POPs,

- Strengthen institutional and industrial capacity for the reduction of unintentionally produced POPs. And implementation of BAT/BEP in key industrial sectors
    - Capacity building of national and local authorities
    - Capacity building within key industrial sectors

- Harminization of Stockholm BAT/BEP implementation with the implementation of Integrated Pollution Prevention and Control (IPPC) of the EU.

- Develop capacity and capability for the identification, analysis and monitoring of POPs and wastes in the environment.

    - Establish and develop of newer and / or more powerful laboratories / or carrying out newer and / or more powerful analysis acquire analytical equipment for analyzing POPs (pesticides, PCBs, dioxin and furans).

        1. References laboratory at the Ministry of Environment and Forestry,
        2. Refik Saydam Hygiene Center of the Ministry of Health,
        3. MRC (Marmara Research Center) of STRCT (Scientific and Technical Research Council of Turkey).

    - Regular analysis research, monitoring environment and human health and control of POPs at the specific laboratories with trained personal, using standardized and accredited methods.

- To develop and implement information and communication system for the management of POPs;

    - Establish national data and information centre on POPs,
    - Formulate and implement communication strategy on POPs,
    - Promote networking among stakeholders at the national and international level,
    - Strengthen existing information centers on chemicals.

- Undertake safe and environmentally sound (SES) tradement and disposal of POPs, POPs-laden equipment and remediation of contaminated sites,

    - Enhance capabilities of line institution and for the safe and environmentally sound (SES) collection, transportation and storage of POPs,
    - Private sector participation in the SES collection transportation, storage, treatment and disposal of POPs promoted,
    - Identify and rehabilitate and / or redesign facilities for the SES storage and disposal of existing POPs pesticides and POPs containing equipment,
    - Develop procedures for the SES treatment and disposal of POPs pesticides, PCBs and PCBs containing equipment,
    - Conduct treatment and disposal of existing stockpiles of POPs pesticides, PCBs and PCBs containing equipment,

- For the management of POPs, the following actions are necessary;
    - Training program on POPs related issues (BAT/BEP guidelines),
    - Establishment of strengthened and central information centers open to public, which are capable of supplying POPs related information.

- Adherence to the following principles is necessary;
    - The environment and human health has to be taken into consideration in all phases of the POPs management
    - The usages of chemicals have to be evaluated together with their possible impacts and harms.
    - The environmental and social effects of pollution have to be evaluated within the context of polluters pay principle.
    - The citizens' right to know should be accepted.
    - An integrated multi-stakeholder process should be considered in the management of chemicals, including POPs.

    - For raising public education and awareness, the following actions are necessary;

        - Training program on POPs related issues (BAT/BEP guidelines),
        - Establishment of strengthened and central information centers open to public, which are capable of supplying POPs related information and
        - Develop policy and legislation for management and control of POPs.

    - For developing, revising and enacting consistent legislation with the Stockholm Convention;

        - Legislation consistent with the Stockholm Convention, and,
        - Legislation regarding gradual phase-out of POPs need. to be enacted

    - For the capacity building the management of POPs, the following actions are necessary;

        - Identification of impacted population through risk assessment and laboratory testing.
        - Reduction dioxin and furan emissions in the most significant sources (ferrous and non-ferrous metal production, production of mineral products, waste incineration and power plants) and
        - Regular and continuous monitoring programs and BAT/BEPs on POPs in every possible POPs emission category.

Financial resources and mechanisms should be identified as the priority for the NIP.

The national priority areas and priority objectives are the results of the evaluations of the Working Teams and the National Coordination Committee, as well as national and international experts. It is also accepted and approved that the working teams will be able to modify the National Implementation Plan for Turkey after NIP training.

An initial assessment of financial resources and budgetary estimate needed for the successful and effective implementation of NIP have been identified. At the national stakeholders meeting / Final Review workshop, a framework for the developing national priority projects as action plans, responsible institutions, duration and total cost were identified.

In conclusion, during the third phase of the POPs project which was concluded by National Priority Validation Workshop, the national priorities and objectives were identified and

validated, recognized and approved by all participants and the members of the National Coordination Committee of POPs issue in Turkey. That was done on the basis of the POPs pre-inventories developed in the second phase of the project. The background documents are given in references of the preliminary inventories.

The references to the Draft Inventory Report are given in the footnote[21].

3.2.3 Major Milestones

Because certain activities of the action plans and strategies of the NIP may overlap or should follow each other in a strict order certain milestones in the action plans need to be identified, which will be used in the coordination for starting activities or measures in other action plans. These milestones, which will be used for harmonising the implementation process, will be elaborated once the implementation starts. They will also be used as evaluation points during the implementation, as well as channelling the finances.

The principles fallowed during the preparation of the NIP for the Stockholm Convention:

- The starting date of the NIP impelementation some time in 2006.

- Ensuring compliance with the National Environmental policy and long-term strategy for sustainable development. In compliance with the target dates of the Convention such as 2025 for phasing out of PCBs is the one of major milestones.

- **National intersectoral coordination**: A coordinated approach will be adopted with cooperation among all relevant stakeholders at all levels of responsibilities related to chemical management as well as those involved in activities that influence chemical safety, including representatives of industry, ministry and public interest groups.

- **Information/data POPs and their management**: Information/data will be collected and where necessary generated especially those specific to the national or local situation, on the human health and environmental data are needed to support decision-making, as well as and manage risks under local conditions.

- **Basic legislation and infrastructure**: legal, institutional, administrative and technical infrastructure will be strengthened to attain adequate levels. This will help enforce regulatory provision of the Stockholm Convention.
- **Identification and assessment of risks posed by POPs**: Risk of POPs to human health and the environment will be assessed. Internationally recognized criteria, standards and limits will be adopted to the extent possible.

[21] REFERENCES
1. Research Task Team, Coordinator: Dr. A. Alev Burcak, March 2005
2. Contamination Task Team, Coordinator: Beyhan Ballı, March 2005
3. Emission Task Team, Coordinator: Sönmez Dağlı, March 2005
4. Institution Task Team, Coordinator: Fehim İşbilir, March 2005
5. Health Task Team, Coordinator: Dr. Nur Ergin, March 2005
6. National Chemical Profile Preparation Team, Coordinator: Prof.Dr. İ.Sahir Çörtoğlu, March 2005
7. Executive Summary, POPs Project Inventory Report, National Project Coordinator, Prof.Dr. Altan Acara, March 2005

- **Risk management based on sound management**: This will cover activities regarding import/export, manufacture/formulation, transport, storage, use and disposal of POPs. Particular attention paid to POP pesticides and PCBs.

- **Risk communication, education and public awareness**: Efforts will be made to sensitise identified groups and the general public on POPs issues.

- **Alternative chemicals**: Research in alternative chemicals to POPs will be rigorously pursued.

- **Review, reporting, evaluation and updating of the NIP** will be done.

- **Obtaining commitment from national stakeholders and institutions** will be pursued.

3.2.4 Institutional / Organizational Arrangements and Assignment of Responsibility

National intersectoral coordination among all relevant stakeholders for the implementation strategy development and capacity building proposal and priorities are also described in 3.2.1. A task team including the National Project Coordinator established as the NIP agency for that is well aware the national POPs inventory of the Stockholm Convention in Turkey.

3.2.5 Implementation Approach

This subjection provide an overview of the NIP implementation activities and the work plan that is proposed to carry them out. This overview of the NIP implementation activities and work plan. This gives that how various action plans and strategies are integrated within the framework of NIP.

The workplan description hihghlight:

- Detailed responsibility assignments
- Implementation schedule
- Budget requirement
- Anticipated sources of financing

The costs of the coordinating measures are given in the action plans of the NIP.

3.2.6 Implementation Strategy Review Mechanisms

The implementation strategy incorporate some mechanism of reporting and monitoring progress. This gives the effectireness of measurements and the performance monitoring indicating the basic tool during the activity.

In addition, this links the outcomes of both the NIP itself and the targeted in the component parts of NIP. This cover also target dates for having any regulatory or legislative action in place and for meeting specific convention obligations.

3.3 Activities, strategies and action plan

This subchapter would list country specific strategies, activities and action plans with the view to accelerate the national efforts towards the fulfillment of the country obligations under the Stockholm Convention (Table 3.1).

Table 3.1 Activities, strategies and action plan

Activities, strategies and action plan	Responsible
• Elimination of POP released into the environment and reduction of human exposure to POPs including household solid fuel combustion, household waste combustion, fives etc.	MoEF, MoH, MoA,
• Liquidation of old loads connected with former POPs production, use, distribution and disposal, especially on the PCBs containing equipments, their destruction an environmentally sound manner for the possible environmental contamination and human exposure.	MoEF, MoH, MoA, Owners/users of PCBs and PCBs containing equipments
• Application of BAT/BET (Best Available Techniques /Best Environmental Practices) principles in a future industrial development strategy.	MoEF, MoI, MoH, MoA,
• Gathering additional data necessary for objective evaluation of the load of these substances on selected areas.	MoEF, MoA, MoH,
• Optimizing monitoring programmes between individual ministries with the goal of realizing tasks associated with the implementation of the SC.	MoEF, MoA, MoH,

3.3.1 Activity: Institutional and regulatory strengthening measures

In Turkey, the issues of chemicals including POPs is of great concern. There is comprehensive legislation for Convention on POPs mandates Parties to take certain measures to achieve the objective of the Convention. A successful implementation of the Convention in Turkey would therefore involve the integration of some of these provisions into the current institutional and regulatory framework for managing chemicals in the country.

The objective is to prevent the production and use of new pesticides and industrial chemicals that are deemed to be candidates of POPs. This action plan therefore aims at strengthening the existing institutional capacities and regulatory framework in Turkey. This means increasing staff, establishing new departments and committees, strengthen in infrastructure such as with new computers by the training if necessary. In Turkey, Annex A and B contents has been banned 10 to 15 years ago by a legislation. Therefore the legislation concerning these chemicals should be tailored to the need of the country and the Convention. The regulation directed to reduction and elimination of unintentional releases of Annex C POPs.

It may be appropriate to draft the regulatory instrument that allows flexibility to expand the list of substances prohibited as need and circumstances require.

- This section describes and emphasise the present institutional structure and their capacities that would most appropriately be involved the governments long-term role in addressing the issues and specifically in regulatory activities including establishing a permanent unit and enforcement (see also section 2.2)

- Accept EU guidelines in such a way that they will be accepted by the European Parliament Council.

- Coordination between individual department of the Ministry of Environment and Forestry and other institutions will be improved.

- Support the implementation of the SC and updating National POPs Inventory by a legal regulations.

- Unify the approach of UNIDO activities with EU legislation.

- To adapt the Turkish legislation in accordance with the SC.

- To provide legislative resolution to problem of the treatment of fly ash from incinerators and other facilities including a new categorization of dumping sites.

- To provide legislative resolution to the problem of POPs disposal, a preference of non-combustion technology to establish standards for POPs disposal based on the principle of POPs destruction efficiency.

- To supplement the Turkish legislation with the limiting values of POPs in sewage (environmental risks, contamination of food chains, to adjust the method of processing sewage water in industrial operation)

- Update the limiting values of POPs in the legislation for control of soil contamination Official Gazette 31th May 2005, no: 25831

- To provide legislative resolution to the problem of legislative approved incineration of oils in small facilities.

- To give legislative resolution to the problem of storing of hazardous waste at dumping sites (newly-created “hot spots”)

- To implement a limit for PCDDs/Fs content and re-evaluate limits for other POPs in waste.

Table 3.3.1 Activity: Institutional and regulatory strengthening measures

Action Plan	Responsible	Resource /Needs[22]	Time Frame	Facilities	Materials	2010 - 2015	Total Cost USD[23]
Institutional and regulatory strengthening measures		**F,Te, Tr C, P, Lx Ta, T**	**Year**	**Rental Conference Workshop facilities**	**Communication presentation equipments, handout and printing materials**		**1.200.000**
• Description and emphasis present institutional structure and their capacities that would most appropriately be involved/the governments long-term role in addressing the issues specifically in regulatory activities including enforcement (see also section 2.2)	MoEF		5				50.000
• Accept EU guidelines in such a way that they will be accepted by the European Parliament Council.	MoEF		2				50.000
• Coordination between individual department of the Ministry of Environment and Forestry and other institutions will be improved to meet the obligations in the Convention including Article 6 Annex A, B and C.	MoEF, MoH, MoA,		2				200.000

[22] Total costs have been calculated on the basis of the following resources/needs
F: Finance
L: Logistics
P: Resource personel
C: Capacity building
T: Training
Lx: Legal expert
Ta: Technical assistant
Te: Technical expert
E: Equipment
Tr: Travel expenses

[23] Total cost is given in 2010 prices.

• Establishing a permanent unit and expertise networks within the country's interface with the participation in the Convention and dealing with the secretariat and other bodies covering information exchange (Article 9) participation in international efforts related to research, development and monitoring (Article 11) technical assistance (Article 12) provision of and request for financial resources (Article 13) and reporting requirements (Article 15, Annex A-Part II, Annex B Part II, Article 5 (a)).	MoEF, MoA, MoH		3				100.000
• Support the implementation of the SC incrasing staff and infrastructure (new computers) with training and updating National POPs Inventory by a legal regulations.	MoEF, MoA, MoH		3				150.000
• Unify the approach of UNIDO activities with EU legislation.	MoEF, MoA, MoH		3				50.000
• To adapt the Turkish legislation in accordance with the SC.	MoEF, MoA, MoH		3				50.000
• To provide legislative resolution to problem of the treatment of fly ash from incinerators and other facilities including a new categorization of dumping sites.	MoEF		3				50.000
• To provide legislative resolution to the problem of POPs disposal, a preference of non-combustion technology to establish standards for POPs disposal based on the principle of POPs destruction efficiency.	MoEF		3				50.000

• To supplement the Turkish legislation with the limiting values of POPs in sewage (environmental risks, contamination of food chains, to adjust the method of processing sewage water in industrial operation)	MoEF, MoA, MoH		3				100.000
• Update the limiting values of POPs in the Soil (Legislation for control of soil contamination Official Gazette 31th May 2005, no: 25831)	MoEF, MoA		3				50.000
• To provide legislative resolution to the problem of legislative approved incineration of oils in small facilities.	MoEF		3				50.000
• To give legislative resolution to the problem of storing of hazardous waste at dumping sites (newly-created "hot spots")	MoEF		4				100.000
• It may be appropriate to expand the prohibition list to the other substances, chemicals the country wants to proactirely eliminate.	MoEF, MoA, MoH		5				100.000
• To implement a limit for PCDDs/Fs content and re-evaluate limits for other POPs in waste.	MoEF, SCRCT (MRC), MoH		3				50.000

3.3.2 Activity: Measures to reduce or eliminate releases from intentional production and use

Turkish government does not currently produce and import or use any POPs chemicals. Except for PCBs which are still used in electrical equipment, there is no legal intentional use of POPs chemicals. However, it is said that in past certain POPs pesticides as well as PCBs may be used illegally.

Therefore if it is necessary to identify additional measures to ban and prohibit the illegal importation and use of POPs pesticides and illegal use of PCBs. Article is of the Convention summarizes activities that must be put in place to reduce and eliminate releases from intentional production. These activities include legal and administrative measures. This action plan presented identifies measures to reduce or eliminate releases from intentional production and use of POPs.

Table 3.3.2 Activity: Measures to reduce or eliminate releases from intentional production and use

Action Plan	Responsible	Resource/ Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Measures to reduce or eliminate releases from intentional production and use		**Te, Tr**	**Year**	**Rental of Conference Workshop facilities**	**Communication presentation and handout prints, computers**	2010	**150.000**
• To reduce eliminate releases from intentional production and use of POPs	MoEF		5				100.000
• To ban / prohibit import / illegal import of Annex A, B, C chemicals (see section 3.3.1 Activity)	MoEF		2				50.000

3.3.3 Activity: Production, Import and export use, stockpiles and wastes of Annex A POPs Pesticides (Annex A, Part 1 chemicals)

This chapter of the NIP should be elaborated on the operational measures related to Annex A POPs pesticides. The Institutional and regulatory measures should be elaborated also in chapter 3.3.1 and 3.3.2.

Table 3.3.3 Activity: Production, Import and export use, stockpiles and wastes of Annex A POPs Pesticides (Annex A, Part 1 chemicals)

Action Plan	Responsible	Resource/ Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Production, Import and export use, stockpiles and wastes of Annex A POPs Pesticides (Annex A, Part 1)		**Te, Tr, E**	**Year**	**Rental of Conference Workshop**	**Communication presentations equipments handouts printing**	2010	**1.250.000**
• To ensure the actual inspection dumping sites for old agrochemical stores, deposits and loads of POPs pesticides and to update the databases	MoA		5				50.000
• To confirm whether, when and where the POPs pesticides (defined by the SC) were irreversibly liquidated is necessary to prepare a programme for their safe disposal.	MoA, MoEF		2				100.000
• To strengthen the authority of Turkish Environmental Inspection.	MoEF		2				50.000
• OCPs must remain a part of the monitoring programmes (international commitment) updating of national inventories and assessment of the impact of human and environmental health. This would be the part of the measures of capacity building. This will also include POPs pesticides could be addressed to EC Directive on incineration of waste (2000/76/EC)	MoEF, MoH, MoA		2				50.000

• To collect and process information about sources and emission of POPs pesticides including waste issues and to link them with a monitoring activities.	MoEF, MoA		5				100.000
• Turkish Environmental Inspection will annually process a report about activities (performed inspections, their results and penalties)	MoEF, MoH, MoA		3				100.000
• Improve inspections and maintenance in order to prevent, avoid accidents, abnormal operation conditions, leakage and spillage.	MoEF, MoA		3				100.000
• Develop safe interm storage	MoEF, MoA,		3				100.000
• Technology transfer and information exchange	MoEF, MoA, MoH, SCRCT		4				100.000
• Clean emptying and repair, demolish storage buildings, safety, packaging.	MoEF, MoA, MoH,		4				600.000

3.3.4 Activity: Production, import and export, use, identification, labeling, removal, storage and disposal of PCBs and equipment containing PCBs (Annex A, part II chemicals)

There is not and has never been any production of PCBs in Turkey. Preliminary inventory revealed that there are PCB containing transformers countrywide and PCB containing capacitors. However, importation and use of closed, semi-closed and open application equipment in the country including PCB containing transformers and capacitors are not properly and completely monitored and documented.

The proposed activities define specific actions in respect of managing PCBs, both in the short and the larger term in a manner that is consistent with the obligations of the Stockholm Convention.

The overall objectives is a reduction and ultimate elimination of PCBs use, the prevention of releases of the chemical into the environment, and to provide for environmentally sound disposals or final elimination of PCBs waste with the obligations of the Stockholm Convention until the year of 2025.

The objectives and priorities of Action Plan is not allow recovery of liquids with a PCB content above 0.005% for sense in order equipment, except for maintance and semiaing operations. Manage stockpiles in a safe, efficient and environmentally sound manner until they are deemed.

Table 3.3.4 Activity: Production, import and export, use, identification, labeling, removal, storage and disposal of PCBs and equipment containing PCBs (Annex A, part II chemicals)

Action Plan	Responsible	Resource/ Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Production, import and export, use, identification, labeling, removal, storage and disposal of PCBs and equipment containing PCBs (Annex A, part II chemicals)		**Te, Tr**	**Year**	**Rental of Conference Workshop facilities**	**Communication presentations equipments handouts printing**	2010	**1.900.000**
• To complete and update the PCB	MoEF,Owners of PCBs /PCBs containing equipment		5				400.000
• The use of PCBs and PCB containing equipment will cease no later than 2025	MoEF,,Owners of PCBs /PCBs containing equipment		5				200.000
Equipment with a PCBs content higher than 50 ppm will be identified and labeled	MoEF, Owners of PCBs /PCBs containing equipment		3				50.000
• To resolve the issue of waste containing PCBs to establish the collection system ensuring the safe disposal	MoEF, Owners of PCBs /PCBs containing equipment		3				100.000
• The proposal of the National Plan hazardous waste handling (for waste containing PCBs/PCTs) to establish necessary specific obligations for public administration	MoEF, Owners of PCBs /PCBs containing equipment		2				50.000
• Tto ensure consistent information about all contaminated areas, and dumping sites, storage sites (consistent inventory of used, stored and disposed waste PCBs)	MoEF, MENRO		5				150.000

• The application of operationally appropriate combustion facilities	MoEF,		3				100.000
• To construct a facility appropriate or the removal of POPs, POPs containing waste, POPs containing or contaminated devices, possibly even contaminated environmental matrices (based on available BAT/BEP principles)	MoEF		4				150.000
• In the case of fly ash to accept the strategy of their recycling in the place of their origin	MoEF		5				100.000
• To ensure and constantly check the storage in owners facilities before transport and quickly ensure to conception of transferring of in appropriately stored waste containing PCBs and devices containing PCBs.	MoEF, Owners of PCBs /PCBs containing equipment		5				150.000
• To ensure and environmentally acceptable method of decontamination of transformers and condensers	MoEF		4				100.000
• To verify parameters, ecological non-defectiveness and expenditures on the biological decontamination of low-burdened soils (under 50 mg/kg)	MoEF, MoH, Owners of PCBs /PCBs containing equipment		3				100.000
• The identification of new possible sources of PCBs	MoEF		5				50.000
• Promotion of replacing the PCBs containing equipment	MoEF		5				50.000
• Assessment of possible human and biota and environmental impacts	MoEF, MoH, Owners of PCBs /PCBs containing equipment		5				150.000

3.3.5 Activity: Production, import and export, use, stockpiles and wastes of DDT (Annex B chemicals) if used in the country

DDT is not produced, imported, exported and used in Turkey. The stockpiles and wastes of DDT and this issue are discussed in previous chapters in previous sections.

The Table show activities the country intends to adapt in the management of DDT in Turkey.

Table 3.3.5 Activity: Production, import and export, use, stockpiles and wastes of DDT (Annex B chemicals) if used in the country (see also 3.3.1 and 3.3.2)

Action Plan	Responsible	Human Resource Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Production, import and export, use, stockpiles and wastes of DDT (Annex B chemicals) if used in the country (see also 3.3.1 and 3.3.2)		**Te, Tr, P**	**Year**	**Rental of Conference Workshop facilities**	**Communication presentations equipments handouts print**	2010	**100.000**
• To update inventory of production, import and export, use, stockpiles and wastes of Annex B chemicals	MoEF, MoA		2				50.000
• Develop data management system for Annex B chemicals	MoEF, MoA		2				50.000

3.3.6 Activity: Register for specific exemptions and continuing need for exemptions (Article 4)

Turkey does not have any industrial capacity for the production of the chemical substances listed in Annexes A and B of SC, and does not plan any future production and use. For these reasons, Turkey does not currently have any requirements for the registration of any specific kind of exemptions for the chemical substances listed in Annexes A and B, Article 4.

Table 3.3.6 Activity: Register for specific exemptions and continuing need for exemptions (Article 4)

Action Plan	Responsible	Human Resource Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Register for specific exemptions and continuing need for exemptions (Article 4)		**Te, Tr, P**	**Year**	**Rental of Conference Workshop facilities**	**Communication presentations equipments handouts print**	2010	**50.000**
• To establish register on specific exemptions on POPs	MoEF, MoA, Owners of PCBs /PCBs containing equipment , MoH		2				50.000

3.3.7 Activity: Measures to reduce releases from the unintentional production of PCDDs/Fs, HCB and PCBs (Article 5).

- BAT/BEP projects and investment in pollution prevention and reductuction in the metal industry sectors.

- BAT/BEP implementation for new incinerators and for cement kilns burning hazardous waste

- Inventory and handling methods for fly ash from incinerators and metallurgic processes, which are heavily contaminated by toxic organic and inorganic substances.

- To support research focused on efficient detoxification of contaminated fly ash and other POPs containing waste.

- Assessment and improvement of the efficiency of the laws and policies relating to the releases of UP-POPs into the environments. Harmonize the implementation with EU regulations and the EC POPs protocol.

- Improvement the emission inventory of unintentionally formed POPs.

- Inventory on specific waste with high chlorine and halogen content from transportation (car shredder, tires, reconstruction of transportation roads) and electronic waste (TVs, computers & IT, refrigerators) and assessment of their environmental sound destruction and disposal,

- To review the economic aspect of the issue of coal combustion in households, due to the fact that the emission inventory indicates a very significant contribution from local furnaces burning solid fuels to the overall POP emissions.

- It is necessary to perform a validation of emission factors from burned coal, wood and biomass in local furnaces and of combined burning with common household waste.

- In connection with the inventory of emissions into the environment, it is necessary to specify the information concerning the release of unintentionally produced POPs into the water, and their residues contained in products and wastes.

- Identify and monitor possible emission sources of unintentionally produced POPs such as combusted biomass in woodworking factories fires at dumping sites and fires at industrial operations and others.

- To conduct a complete characterization of areas with ambient air loads by all POPs (industrial regions) including combining the emission-ambient air information with a goal to prepare policy for the limitation of emissions from all small sources, which contribute significantly to the total emission flow.

- To utilize accessible information of the Emission Inventory in sources such as crematoriums veterinary burning facilities, small hospital waste incinerators etc.

- In the long run, to give preference to process for the generation of waste mineral oils and ecological lubricants such as, for example, the process of recycling with the help of a single pipe reactor, although the combustion of waste oils in pan and torch boilers is an acceptable technology when considering POP emissions.

- When conducting research, to focus attention on the levels of POPs evaporated from soil, dumping sites, and water surfaces as an addition to the total POP emissions in Turkey.

- To promote education and training with regard to awareness of the strategies to meet the obligation in Stockholm Convention and review every five years of the strategies and their succes.

Table 3.3.7 Activity: Measures to reduce releases from the unintentional production of PCDDs/Fs, HCB and PCBs (Articles 5).

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Measures to reduce releases from the unintentional production of PCDDs/Fs, HCB and PCBs (Article 5)		**P, Ta, Te, T, E**	**Year**	**Rental of Conference Workshop facilities LaboratorFacilities and chemicals**	**Communication presentation and handout, printing**	**2010**	**3.400.000**
• Development to additional strategies for decreasing emissions of unintentional produced POPs.	MoEF, MENRO, MoH, SCRCT (MRC)		3				100.000
• BAT/BEP projects and investments in the metal industry sectors.	MoEF, Private Sector and Industry		3				1.500.000
• Reduction of POPs emissions for incinerators and cement industry by BAT/BEP measures..	MoEF, Private Sector and Industry		3				300.000
• Inventory and handling methods for fly ash from incinerators and metallurgic processes, which are heavily contaminated by toxic organic and inorganic substances	MoEF		3				200.000
• To support research focused on efficient detoxification of contaminated fly ash and other POPs containing waste.	MoEF, SCRCT (MRC)		5				100.000
• Improvement the emission inventory of unintentionally formed POPs.	MoEF, SCRCT (MRC)		5				100.000
• To conduct measurement of POPs emissions connected with the increasing natural gas consumption in house hold, and more efficient waste management.	MoEF, SCRCT (MRC)		5				50.000

• To review the economic aspect of an issue of coal combustion in households	MoEF, SCRCT (MRC)		4				100.000
• To perform validation studies of emissions from burned coal, wood and biomass in local furnaces and of combined burning common household waste	MoEF		4				100.000
• To specify the information concerning the release of unwanted POPs into the water, and their residues contained in products and wastes.	MoEF, MoH		5				120.000
• To identify and monitor possible emission sources (unwanted POPs emission)	MoEF, MoH, STRCT (MRC)		5				150.000
• To conduct a complete characterization of areas with ambient air loads by all POPs (prepare policy for limitation of emissions from all small sources, which contribute significantly to the total emission flow)	MoEF, SCRCT (MRC)		3				100.000
• To utilize accessible information about emission from the metallurgic sector (a politic of limiting these emissions and initiation of other measurements)	MoEF, SCRCT (MRC)		3				100.000
• To prefer processes of generations of waste mineral oils and ecological lubricants.	MoEF, MoI, EMRA		3				50.000
• To focus attention on the levels of POPs evaporated from soil, dumping sites, and water surfaces.	MoEF, MoA, MoH		3				80.000
• To evaluate of the efficiency of the laws and policies relating to the management of the releases of UP-POPs into the environments. Harmonize the implementation with EU regulations and the EC POPs protocol.	MoEF		3				100.000

• To process information about POPs issue in the army	MoEF, MoD		5				50.000
• To promote education and training with regard to awareness of the strategies to meet the obligation in Stockholm Convention and review every five years of the strategies and their succes.	MoEF, MoH, MoA, MENRO, SCRCT (MRC)		5				200.000

3.3.8 Activity: Identification of stockpiles, articles in use and wastes plan for assessment and management of releases from stockpiles and wastes (Articles 6).

- Fundamental to the liquidation of this problem associated with historical pollution by POPs is the completion of the database of hotspots, old loads, and contaminated areas.

- Besides drawing up a consistent inventory of stockpiles, articles in use and wastes it is necessary to establish procedures for their liquidation.

- Resolution of unsolved or newly discovered problem cases.

- It is therefore necessary to rapidly map out all old ecological burdens containing POPs (to locate current information in accessible data sources, and actualalise information about them)

- In relation to this to conduct an investigation of localities, assess the risks and suggest corrective measures (including the input of new information into the existence data)

- To process the liquidation of burdens with the appropriate financial coverage (including the input of new information into the existence data)

- The problem of waste from incinerators that was already mentioned, the creation of fly ash, and its fate is another a high priority for resolution up to 80% of PCDDs/Fs remains in fly ash. It is therefore necessary to perform a consistent preparation of the legislation regulating the problem of treating waste from incinerators and their solidification is needed.

- From the perspective of waste management, it is necessary to resolve the question of economic set-up of the relationship of recycling-burning-dumping and discharging to receiving environment.

- The long-term storage of materials containing any type of POPs at dumping sites is inconceivable. They are a source of problems for the future and it can only be regarded as a temporary solution requiring necessary securing against any kind of possible environmental contamination. This means that storing waste at dumping sites need complete sealing from the biosphere to prevent the entry POPs into food chains. Surveyed methods of safe dumping are not presented and data pertaining to their amounts are not available.

- It is therefore necessary to perform an inventory of sewage sludge from waste water treatment plants in terms of released POP concentrations: to set quality levels, to establish technological priorities and parameters for detoxification, to evaluate investment demands on technological adjustments and depending on the financial situation to ensure possible co-financing, to systematically separate industrial sewage water from communal ones, with the simultaneous elimination of possible POP entries water waste treatment plant.

- To support the research and development of new technologies and biotechnologies focused on the eventual liquidation of problematic waste and contaminated matrices.

Table 3.3.8 Activity: Identification of stockpiles, articles in use and wastes plan for assessment and management of releases from stockpiles and wastes Pesticides, DDT, PCBs and HCB (Annex A, B and C Chemicals)

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Identification of stockpiles, articles in use and wastes plan for assessment and management of releases from stockpiles and wastes Pesticides, DDT, PCBs and HCB (Annex A, B and C Chemicals)		**P, Te, Ta, T, E**	**Year**	**Rental of Conference Workshop facilities**	**Communication presentations equipments handout printing**	2010	**1.750.000**
• The completion of the database of hotspots, old loads, and contaminated areas (POPs).	MoEF, MoA Owners of PCBs /PCBs containing equipment		3				200.000
• To establish procedures for their liquidation of these ones.	MoEF		2				200.000
• Resolution of unsolved or newly discovered problem cases.	MoEF, MoA, Owners of PCBs /PCBs containing equipment MoH		3				150.000
• To rapidly map out all old ecological burdens containing POPs.	MoEF, MoA, Owners of PCBs /PCBs containing equipment MoH		3				150.000
• To conduct an investigation of localities, and assess the risk including a suggestion of corrective measures.	MoEF, MoA, Owners of PCBs /PCBs containing equipment MoH		5				100.000
• The liquidation programme of burden with the appropriate financial coverage.	MoEF, MoA, Owners of PCBs /PCBs containing equipment MoH		3				100.000
• Reduced and prohibit the long-term storage of materials containing any types of POPs at dumping sites.	MoEF, MoA, EMRA		3				100.000

• To perform and Inventory of sewage sludge from Waste Water Treatment Plants in terms of released POPs concentration.	MoEF, MoH		4				100.000
• To support of the research and development of new technologies focused on the eventual liquidation of problematic waste and contaminated matrices.	MoEF, MoH, SCRCT (MRC)		5				300.000
• To resolve the problem of waste from incinerators (the creation of fly ash, and its fate)	MoEF, SCRCT (MRC)		3				100.000
• To resolve the question of economical set-up of the relationship recycling-burning-dumping (from the perspective of waste managament)	MoEF, SCRCT (MRC)		3				100.000
• To design licensing, operation, tracking and monitoring of storage facilities for handling and transportation of POPs wastes	MoEF, MoH, Owners of PCBs /PCBs containing equipment MoA		4				150.000

3.3.9 Activity: Identification of contaminated sites (Annex A, B and C Chemicals) and remediation in an environmental sound manner

- To conduct a thorough inventory of contaminated areas with an analysis of ecological risks, to evaluate the necessity of decontamination, along with an economic evaluation, assessment of performing such an activity as a basis for the management of contaminated areas.

- To take advantage of the on site (in situ) methods for their clearance, in order to decrease the potential risk of spreading pollutants from contaminated sites.

- To increase the emphasis on prevention of creation of new ecological burdens, primarily by close supervision of sanitation processes, and better legislation in the field of treatment of waste containing POPs (establishing limits for their storing and combustion).

Table 3.3.9 Activity: Identification of contaminated sites (Annex A, B and C Chemicals) and remediation in an environmental sound manner

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Identification of contaminated sites (Annex A, B and C Chemicals) and remediation in an environmental sound manner		**P, Ta, Te, T**	**Year**	**Rental of Conference Workshop facilities**	**Communication presentations equipments handout printing traing materials**	2010	**300.000**
• A thorough inventory of contaminated areas with an analysis of ecological risks, to evaluate the necessity of decontamination.	MoEF, MoH, Owners of PCBs /PCBs containing equipment		3				100.000
• To take advantage of the on site (in situ) methods for their clearance and clean up standards.	MoEF, MoH, Owners of PCBs /PCBs containing equipment		3				100.000
• To increase the emphasis on prevention of the creation of new ecological burdens.	MoEF, MoH, Owners of PCBs /PCBs containing equipment		3				100.000

3.3.10 Activity: Manage stockpiles and appropriate measures for handling and disposal of articles in use.

- Identify appropriate storage facilities for interim storage of stockpiles.
- Upgrade existing information for safe management of stockpiles.
- Develop manuals for safe handling and disposal.
- Develop guidelines for the transport of articles in use to safe locations.
- Establish collection centers or scheme for articles in use.

Table 3.3.10 Activity: Manage stockpiles and appropriate measures for handling and disposal of articles in use.

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Activity: Manage stockpiles and appropriate measures for handling and disposal of articles in use.		**P, Ta, E**	**Year**	**Rental of Conference Workshop facilities**	**Communication presentations equipments handout printing traing materials**	2010	**200.000**
• Identify appropriate storage facilities for interim storage of stockpiles.	MoEF, MoH, MoI		3				50.000
• Upgrade existing information for safe management of stockpiles.	MoEF, MoA, -MoH		4				60.000
• Develop manuals for safe handling and disposal.	MoEF, MoA, MoH		3				40.000
• Develop guidelines for the transport of articles in use to safe locations.	MoEF, MoA, MoH		3				50.000
• Establish collection centers or scheme for articles in use.	MoEF, MoA, MoH						

3.3.11 Strategy: Identification of contaminated sites (Annex A, B and C Chemicals) and remediation in an environmentally sound manner.

Stockholm Convention, Article 6 requires that parties develop appropriate strategies for the identification of sites contaminated with chemicals listed in Annex A, B or C and remediation of such sites be carried out in an environmentally sound manner. The strategy is as outline below:

- Identify sites contaminated with Annex A, B and C Chemicals
- To institute remediation measures for identified contaminated sites secure and label sites, identify potential remediation technologies available.
- Establish regulations and guidelines for clean up of contaminated sites.
- Train and upgrade skills of personnel in the application of identified remedial measures.

Table 3.3.11 Strategy: Identification of contaminated sites (Annex A, B and C Chemicals) and remediation in an environmentally sound manner.

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Materials	Starting	Total Cost USD
Strategy: Identification of contaminated sites (Annex A, B and C Chemicals) and remediation in an environmentally sound manner.		**P, Ta, Tr, T, E**	**Year**	**Rental of Conference Workshop facilities**	**Communication presentations equipments handout printing training materials**	2010	**450.000**
• Identification sites contaminated with Annex A, B and C Chemicals	MoEF, MoA, MoH		5				150.000
• To institute remediation measures for identified contaminated sites secure and label sites, identify potential remediation technologies available.	MoEF, MoA, MoH		5				100.000
• Establish regulations and guidelines for clean up of contaminated sites.	MoEF, MoA, MoH		3				100.000
• Train and upgrade skills of personnel in the application of identified remedial measures.	MoEF, MoA, MoH		3				100.000

3.3.12 Activity: Facilitating or undertaking information exchange and stakeholder involvement

Information exchange is vital for sound management of chemicals. Efficient information exchange on POPs in Turkey would ensure that all stakeholders involved in all aspects of national chemical management and safety required information will be related with their needs.

- To establish a national focal point for the exchange of information
    - Designation national focal point for information exchange
    - Identify appropriate information required for information exchange
    - Permit Professional and support staff such as data analysts, information technologists, public relation officers etc.
    - Purchase and install equipments such as computers, communication gadgets etc.
    - Subscribe to internet websites with links to sources listed in the national inventory etc.
    - Develop internet website
- To equip staff with relevant skills
    - Train staff at focal point with relevant skills
- To strengthen National capacity to collect and use multi sectorial information
    - Identify the resource per tons
    - Carry out needs and assessment
    - Develop training materials and programmes
    - Carry out training
- To obtained stakeholder commitment
    - Identify relevant stakeholder institutions/partners
    - Communicate with identified stakeholders
    - Obtained feedback from stakeholders
    - Involves stakeholders in programmes

Table 3.3.12 Activity: Facilitating or undertaking information exchange and stakeholder involvement

Action Plan	Responsible	Resource Needs	Time Frame	Facilities / Training Materials	Starting	Total Cost USD
Activity: Facilitating or undertaking information exchange and stakeholder involvement (see page 174)		**P, Te, Tr, T, C**	**Year**	**Rental areas and space farn ture equipment computer software**	2010	**600.000**
• To establish a national focal point for the exchange of information	MoEF		3			150.000
• To equipt staff with relevant skills	MoEF		3			150.000
• To strengthen National capacity to collect and use multi sectorial information	MoEF		3			200.000
• To obtained stakeholder commitment	MoEF		1			50.000
• Confidentiality on health related issues	MoEF, MoH		1			50.000

3.3.13 Activity: Public awareness, information and education

The successful implementation of SC on POPs in Turkey will only be achieved when the public is sensitized and aware on the nature of POPs and their effects on human health and environment. It is therefore important for action to be directed at promoting the continuous and detailed public awareness, training and information on POPs.

- To develop and produce public awareness program on POPs
  - Develop and produce awareness raising materials such as brochures, posters, newsletters etc. on POPs considering the limitation of financial and technical capacity
  - Develop radio, TV educational programmes
  - Write articles, book ect and promote them

- To create awareness among policy and decision maters/traditional authorities on POPs
  - Identify relevant decision and policy makers/traditional authorities
  - Organize, workshop, seminars to sensitive identified groups

- To implement public education programmes
  - Provide the information to the medias
  - Identify resource person for public education, for NGOs and the mustries as well as municipalities
  - Train resource personnel
  - Contact with the educational Institutions related with POPs

- To promote public awareness in addressing effect on POPs on human health and environment
  - Promote benefits and use of alternatives to POPs
  - Organize radio, tv programmes

- To compile and collect information on POPs
  - Establish Information Centers
  - Develop mechanisms for the collection of information on POPs listed in Annexes A, B and C

- To promote and facilitate information dissemination

  - Develop web sites, newsletters
  - To Promote Information on POPs in the Ministries, Institutions

- To train workers, scientist, educators technical and managerial personnel of relevant institutions
  - Develop courses for the trainees
  - Produce training materials
  - Organize workshops and seminars

Table 3.3.13 Activity: Public awareness, information and education

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Material	Starting	Total Cost USD
Activity: Public awareness, information and education (see page 176)		**P, Ta, Te, T, E**	**Year**	**Rental conference workshop facilities vehicles**	**Communication presentations equipments handouts and printing training materials**	2010	**1.700.000**
• To develop and produce public awareness programme considering the limitation of financial and technical capacity.	MoEF, MoA, MoH, MARA		5				400.000
• To create awareness among policy and decision maters/traditional authorities on POPs	MoEF, MoA, MoH, MARA		3				150.000
• To implement public education programmes	MoEF, MoA, MoH, MARA		5				300.000
• To promote public awareness in addressing effect on POPs on human health and environment	MoEF, MoA, MoH, MARA		5				250.000
• To compile and collect information on POPs	MoEF, MoA, MoH, MARA		3				150.000
• To promote and facilitate information dissemination	MoEF, MoA, MoH, MARA		3				150.000
• To train workers, scientist, educators technical and managerial personnel of relevant institutions	MoEF, MoA, MoH, MARA		5				300.000

3.3.14 Activity: Effectiveness evaluation (Article 16)

The Stockholm Convention Article 16 requires parties to establish mechanisms for providing comparable monitoring data on the presence of Annex A, B and C Chemicals. This evaluation shall be conducted on the bases of available scientific environmental, technical and economic information including national reports.

- To evaluate to effectiveness of the implementation of the convention in Turkey
    - Develop an evaluation Programme
    - Develop checklist or format for evaluation
    - Develop national performance evaluation criteria
- To report on evaluation results
    - Mechanism for reporting
    - Preparation of evaluation report
- A guidance for a global monitoring programme for POPs has been purposed (UNEP/POPs/COP.1/INF/23, and the first edition of a global inventory of POPs laboratories has been prepared (UNEP/POPs/COP.1/INF/24)). Both technical documents and discussion materials on effectiveness evaluation (UNEP/POPs/COP.1/21) at COP.1 can be obtained from the website of the Convention (www.pops.int).

Table 3.3.14 Activity: Effectiveness evaluation (Article 16)

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Material	Starting	Total Cost USD
Activity: Effectiveness evaluation (Article 16)		**P, T, Ta, E, Te**	**Year**	**Rental conference workshop facilities**	**Communication presentation equipment handouts and printing**	2010	**1.000.000**
• To evaluate to effectiveness of the implementation of the convention in Turkey	MoEF, MoA, MENRO, MoH		2				500.000
• To report on evaluation results	MoEF, MoA, MENRO, MoH		2				500.000

3.3.15 Activity: Reporting

The Stockholm convention, Article 15 on POPs mandates parties to report to the conference of Parties COPS on measures taken to implement the provisions of the convention as well as the effectiveness of the measures taken.

In addition, each party provide to the secretariats statistical data on its total quantities of productions, import export of each of the POPs listed in Annex A and B as well as a list of states from which it has imported/exported each of such substances. This report will provide a substantial input to the effectiveness evaluation of the convention (Article 16), which will begin four years after the entry into force of the Convention

- To report on measures taken to implement provisions of the Stockholm Convention

  • List measures developed to implement provision of convention
  • Develop reporting format in line with convention format
  • Identify software to report statistical data and results of the implementation the Stockholm Convention

- To report on measures taken to reduce or eliminate releases from intentional production and use of Annex A and B chemicals

  • Provide report on following:
  • Legal/administrative measures taken to eliminate to production and use of Annex A chemicals with dates
  • Measures taken to restrict the production and/or use of Annex B chemicals with dates
  • Legal or administrative measures necessary to eliminate the import/export of chemicals listed in Annex A of convention
  • Measures regarding the import/export of chemicals listed in Annex B in the Convention.

- To report on measures to reduce or eliminate releases from unintentional production

  • Provide report on following:
  • Action plan to identify, characterize and address releases of Annex C chemicals
  • Implementation of action plan
  • Difficulties and successes of implementation
  • Evaluation if current and protected releases from anthropogenic sources of chemicals listed in Annex C by the following specific actions:
  • Development of format for evaluation comprising
  • Source Category
  • Annual releases (gTEQ /a)to air, water ,land, product and residue
  • Generation of data for current releases
  • Generation of data for protected releases
  • Analysis of data compilation of report
  • Review of strategies and of their success in meeting the obligations of Article 5

- To report on measures to reduce releases from stockpiles and wastes

• Design data collection/inventory format for collection of data on
• Stockpiles consisting of is containing chemical listed in either Annex A or B i.e. Type of chemical, quantity of stock locations and condition of stock
• Products and articles is use and wastes containing or contaminated with chemicals listed in Annex A, B or C
• Conduced training on use of inventory format
• Collection of data
• Analysis of data and compilation of report
• Report on Legislative or/and administrative measures to manage stockpiles

- To provide inventory on total quantities of production, importation and exportation of chemicals listed in Annexes A and B of Convention

• Design and pilot test an inventory format collection of data on name f chemical total annual production (Kg/Yr) s total annual export and destination countries.
• Train collaborating stakeholders factories inspection use of inventory format
• Collection of data at various sources of illegal entry points in Turkey
• Analysis and compilation of report

- To report on progress in eliminating PCBs

• Provide report on following:
• Measures taken to encourage research, development and monitoring of POPs including sources and releases into the environment, presence, levels and trends in humans and the environment etc as listed in Article 11. paragraphs.
• Development of format for presentation of results/reports
• Sensitization of stakeholders e.g. researchers on need to submit regular reports/findings to national focal point using format developed for presentation.
• Generation of reports from information centres e.g. Poisons Control Centres
• Measures taken to store and maintain information generated from research, development and monitoring
• Overall report on research, development and monitoring.

- To report on information exchange

- To report on public information, awareness and education

- To report on research, development and monitoring.

Table 3.3.15 Activity: Reporting

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Material	Starting	Total Cost USD
Activity: Reporting		**P, Ta, T, Te, E**	**Year**	**Rental conference workshop facilities**	**Communication presentation equipment handouts and printing**	2010	**1.000.000**
▪ To report on measures taken to implement provisions of the SC	MoEF, MoA, MoH, SCRCT (MRC)		2				200.000
▪ To report on measures taken to reduce or eliminate releases from intentional production and use of Annex A and B chemicals	MoEF, MoA, MoH, SCRCT (MRC)		2				100.000
▪ To report on measures to reduce or eliminate releases from unintentional production	MoEF, MoA, MoH, SCRCT (MRC)		2				100.000
▪ To report on measures to reduce releases from stockpiles and wastes	MoEF, MoA, MoH, SCRCT (MRC)		2				100.000
▪ To provide inventory on total quantities of production, importation and exportation of chemicals listed in Annexes A and B of SC	MoEF, MoA, MoH, SCRCT (MRC)		2				100.000
▪ To report on progress in eliminating PCBs	MoEF, MoA, MoH, SCRCT (MRC)		2				100.000
▪ To report on information exchange	MoEF, MoA, MoH, SCRCT (MRC)		2				100.000
▪ To report on public information, awareness and education	MoEF, MoA, MoH, SCRCT (MRC)		2				100.000
▪ To report on research, development and monitoring	MoEF, MoA, MoH, SCRCT (MRC)		2				100.000

3.3.16 Activity: Research, development and monitoring (Article11)

Stockholm Convention, Article 11 mandates parties obligate appropriate research, development, monitoring and cooperation pertaining POPs. From initial assessment conducted, it was established that the country lacks infrastructure and institutional capacities to handle research and development issues relating to POPs.

This section therefore identifies various activities in the research, development and monitoring needs of Turkey.

- To develop institutional and research capacity to manage POPs.
  - Identify institutions with the potential to undertake research into POPs.
  - Strengthen national scientific and technical research capabilities and infrastructure to promote assess to exchange of data and analysis.
  - Develop mechanism for networking among identified research intuitions.
  - Undertake research aimed at alleviating the effects of POPs on reproductive health.
  - Establish procedures for communicating research and development findings to to the public
  - Undertake research to identifying alternatives to POPs.
- To identify appropriate laboratories to monitor all POPs activities.
  - Upgrade infrastructure of three laboratories to analyses Annex A, B and C chemicals
- To upgrade three laboratories capable of analyzing Annexes A, B and C chemicals.
  - Compile list of existing laboratories(see National Chemical Profile)
  - Develop criteria for the assessment of capacities of existing laboratories to analyses POPs.
  - Assess and select laboratories.
- To monitor levels of concentration of POPs in environment
  - Select matrices to sample.
  - Determine appropriate methods of sampling and analysis to apply
  - Analysis of soil, air, water, human milk, other biota for presence of POPs.
- To undertake proper management of data
  - Establish procedures for the management of analysis results
  - Develop internationally recognized guidelines for interpreting monitoring results and presenting monitoring reports
- To establish mechanism for quality assurance and control of monitoring activities.
  - Establish effective quality assurance and quality control system
  - Setting up of review panel to evaluate data prior to acceptance.

Table 3.3.16 Activity: Research, development and monitoring (Article11)

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Material	Starting	Total Cost USD
Activity: Research, development and monitoring (Article11)		**P, Ta, Te, T, E**	**Year**	**Rental conference workshop facilities laboratuar equipment and space**	**Communication presentation equipments handouts and printing material electrical euipments**	2010	**8.300.000**
▪ To develop institutional and research capacity to manage POPs	MoH, MoEF, SCRCT (MRC)		5				4.200.000
▪ To identify appropriate laboratories to monitor all POPs activities.	MoH, MoEF, SCRCT (MRC)		2				50.000
▪ To upgrade three laboratories capable of analyzing Annexes A, B and C chemicals.	MoH, MoEF, SCRCT (MRC)		5				750.000
▪ To monitor levels of concentration of POPs in environment	MoH, MoEF, SCRCT (MRC)		5				2.500.000
▪ To undertake proper management of data	MoH, MoEF, SCRCT (MRC)		2				500.000
▪ To establish mechanism for quality assurance and control of monitoring activities.	MoH, MoEF, SCRCT (MRC)		2				300.000

3.3.17 Activity: Technical and financial assistance (Article 12 and 13)

For Turkey to full its obligations under the Stockholm Convention for POPs depend on the provision of adequate financial and technical assistance.

The following actions would be required to enable the country obtain the needed financial and technical support required for the successful implementation of activities and actions to be carried out to achieve the POPs overall objectives.

- To source for technical assistance towards the successful implementation of the Convention
    - Asses technical needs
    - Identity sources of financial assistance
- To source for financial assistance towards the successful implementation of the Convention
    - Financial needs assessment
    - Identity sources of financial assistance
    - Requisition for financial assistance through proposal writing

Table 3.3.17 Activity: Technical and financial assistance (Article 12 and 13)

Action Plan	Responsible	Resource Needs	Time Frame	Facilities	Material	Starting	Total Cost USD
Activity: Technical and financial assistance (Article 12 and 13)		**P, Te, Ta, T, E**	**Year**	**Rental conference workshop facilities**	**Communication presentation equipments handouts and printing**	**2010**	**200.000**
▪ To source for technical assistance towards the successful implementation of the Convention	MoEF		2				100.000
▪ To source for financial assistance towards the successful implementation of the Convention	MoEF		2				100.000

3.4 Development and capacity building proposals and priorities

The priority activities aimed at the complete implementation of the Stockholm Convention, indicate areas where strengthening of the potential is necessary. The fall implementation of the NIP for the SC requires the strengthening of the national capacities.

Additional, technical an financial input as well as human resources will be required to continue the inventory of POPs containing and POPs contaminated waste, stocks and equipment, including equipment contaminated with PCBs. Turkey has not sufficient technical and professional capacity to implement these task and the available financial sources are also insufficient.

This section presents initial five (5) project proposals to applicable in the NIP. The overall goal of the project is to improve the management of risk to human health and the environment from POPs. The specific project and their respective objectives are summarized below.

These proposals can be also put in the following headings

3.4.1 Key invertment Requirements and Priorities
3.4.1.1 Immediate measures / project (1-3 years)
3.4.1.2 Medium – term measures / project (4-10 years)
3.4.1.3 Long term measures / project (11-25 years)
3.4.2 Conceptual Financial Plan

No	Project Propose	Objectives	Time Frame	Budget (USD)
1.	Strengthen human and institutional capacity for the management of POPs	• Develop guidelines environmentally sound management of POPs • Develop policys legislation for the management and control POPs • Develop capacities in relevant institutions for the management of POPs and BAT/BEP implementation • Promote coordination of activities of relevant ……. of POPs	2 years	200.000
2.	To develop capacity and capability for the identification analysis and monitoring of POPs in the environment	• Legrade at least 2 laboratie and acquire analytical equipment for analyzing POPs • Train staff to run laboratories • Assess levels of POPs in the environment	5 years	3.500.000
3.	To develop and implement information and communication system for	• Establish national data and information centre on POPs • Formulate and implement	1 years	150.000

	management of POPs	communications strategy on POPs • Promote networking among stakeholders at the national international levels • Establish poison information and management centres		
4.	Investigate and assess the nature and severity of health effects expecienced by humans as a result of exposure to POPs	• Estimate nature and severty of health effects experienced by high risk groups • Recommend opportunities for management interventions required to reduce identified adverse effects and risks to acceptable levels • Strengthen capacity of health centres to handle POPs poisoning	5 years	160.000
5.	Convention of an interm storage facility for PCBs containing wastes	• Reduce exposure to human health and environment to PCBs in use • Ensuring safe management of PCBs and containing equipments • Buildings facilities for safe dioposal of all PCBs and PCBs containg equipments	2 years	1.000.000

3.5 Timetable for plan implementation and measures of success

The implementation schedule of the National Implementation Plan for the Stockholm Convention can be divided into two periods: during the first phase covering the years 2010 to 2012, priority will be given to organizational, legislative, administrative and technical support activities, while the second one, going beyond 2012, will focus mainly on activities related to the operational implementation of these activities.

Preparatory legislative and organizational activities should be undertaken in 2009 and the ratification of the Stockholm Convention by Turkey in 2010. Simultaneously, an assessment is planned on the state of environment with respect to its contamination by POPs, along with the development and implementation of educational programmes of the technical staff as well as the education and training on awareness of public programmes.

In 2011 databases should be established and put into operation and implementation of all on going activities of a continuous nature should be accomplished.

The year 2012, will be devoted to the evaluation of progress made in implementing he provisions of the SC and to the preparation of reports which will have to be submitted to the Conference of the Parties in 2014. A detailed work plan for different activities is presented in.

The elimination of obsolete pesticide and the decontamination of PCBs containing equipment will continue in the first phase of the period covering the years 2010-2015.

Due to the project preparation an the process of gathering the necessary funds on the investment projects connected with alternative and now technologies for waste treatment would be possible during the second phase of the timetable of the NIP.

3.5.1 Participation of the Stakeholders

One of the important implementation principle of the NIP is the inclusion of public and stakeholder participation and contribution.

In addition the POPs issue impacts on many sectors of society and economy including policy-making, the public and various interest groups. Relevant national stakeholder institutions and groups were identified, sensitized and assigned with responsibilities from the on set of the NIP development process.

An initial workshop intended to provide an excellent opportunity for raising awareness at the national level as well as bringing together all relevant stakeholders in sound chemicals management for an open discussion and effective communication was organized.

To insure continuity a multi stakeholder National Coordinating Committee (NCC) together with its Task Team for sound management of chemicals was set up during 2004 to oversee the preparation of the National Profile on Chemicals Management. This NCC also coordinated National Action Programme for integrated Chemicals Management in Turkey. In addition, these stakeholders served also the steering committee of the POPs enabling activities of the Project.

During preparing the NIP the Ministry of Environment and Forestry consulted with stakholders and solicited their advice on the development and content of the plan.

In summary, the stakeholder advice with respect to how Turkey should implement its obligations in the NIP under the Convention. All the stakeholders supported the programs and initiatives to insure that the obligations and the sprit of the Convention were reflected.

Stakeholders indicated that the Government of Turkey need to take a leadership role and to work cooperatively with the institutions in implementing the Convention as well as recognize the existing actions to mitigate POPs as part of the NIP.

Stakeholder indicated also that there is a great increasing concern on the POPs issues in Turkey.

Its clear indication was the final NIP workshop held in Ankara on January 25, 2006 under the severe icecy winter condition (-20 °C). For this workshop 53 participant were present (Annex-2).

3.6 Resource requirements*

A summary of resource required for the successful and effective implementations of the identified tasks and activities of the National Implementation Plan for Turkey are following.

In this National Implementation Plan (NIP), activities and the actions have been prepared in accordance with the overall their durations and costs, as well as for the Ministries which will take part in these activities and actions have been specified separately. The total costs for the action plans and strategies have been calculated and shown in Table 3.6.

Table 3.6 Administrative Financial Statement (2010-2011)

Component	Number Year Unit	Unit Cost USD	Unit Cost USD/Year	Total Cost USD(1)
Administration and coordinating mechanisms				
Personnel	30	2.500	900.000	1.800.000
Administrative expences	30	1.000	30.000	60.000
Local and International Travel	30	5.000	150.000	300.000
Equipment	-	-	3.000.000	6.000.000
Component total			4.080.000	8.160.000
Guidelines development				
Technical assistance (local)	30	1.000	30.000	60.000
Technical assistance (international)	10	25.000	250.000	500.000
Stakeholder consultations	10	1.000	10.000	20.000
Document production	30	2.000	60.000	120.000
Component total			350.000	700.000
Development of policy and legislation				
Technical assistance (local)	10	1.000	10.000	20.000
Technical assistance (international)	5	25.000	250.000	500.000
Stakeholder consultations	10	1.000	10.000	20.000
Component total			270.000	540.000
Grand TOTAL			**4.700.000**	**9.400.000**

(1) The total costs are in 2010 prices.

In these calculations, the legal liabilities of the Ministries have been taken into account.

Within the NIP, seventeen activities have been identified in accordance with the UNEP format and a total of 127 action plans and strategies have been developed for these activities.

When the legal authorities within those 17 activities are taken into consideration, it is observed that Ministry of Environment and Forestry has a participation of 67% in this project, while the Ministry of Agriculture and Rural Affairs has 7.0%, the Ministry of Health has 10.0%, the owners and users of PCbs and PCB containin equipmanthave 7.0%, and STRCT-MRC represents the remaining 9.0% (Table 3.6.1).

* This estimate is not include the cost of the elimination of the absolute pesticides and elimination of the PCBs and PCBs containing equipments or cleaning equipments including transportation, proper pre-storage facilities, destruction and related expences. In short this estimate is not include in the UNIDO Project (Project No. GF/TUR/03/008)

According to these results, the annual budget breakdown of the Ministries and organizations has been given in Table 3.6, as stated above.

In this Table, laboratory support and upgrading has been envisaged for the Ministry of Environment and Forestry, the Ministry of Health and TUBITAK-MRC, as stated in the project priorities.

In short, the total annual budget of the National Implementation Plan has been calculated to be USD 4.7 million per year, and thus the 5-year total comes up to be USD 23.5 million.

The Ministries and organizations shall be able to implement their action plans if they are allocated the following annual sums) for a duration of 5 years: the Ministry of Environment and Forestry USD 2,419,160; the Ministry of Agriculture and Rural Affairs USD 449,448; the Ministry of Health USD 1,257,472; the Ministry of Energy and Natural Resources (three General Directorates and other PCBs equipment users) USD 388,048 and STRCT-MRC USD 1,257,472.

In summary:

1. Project No: GF/TUR/03/008
2. Location of Project: in Turkey
3. Date of Submission: December 2010
4. Total cost of Project: USD 23.400.000
5. Duration of Project: 5 years (2011 to 2016)

Table 3.6.1 Participation of the Ministries and Institutions in Activities and Action Plans (%)

	Action Plan No.	**Activity**	**Participation (%)**					
S -	15	3.3.1	Ç – 0,5	T – 0,1	SB – 0,25	E – 0,05	STRCT – 0,01	
	2	3.3.2	Ç – 1,0	-	-	-	-	
T -	9	3.3.3	Ç – 0,6	T – 0,2	SB – 0,1	E – 0,1	-	
E -	21	3.3.4	Ç – 0,4	T – 0,05	SB – 0,1	E – 0,45		
T -	2	3.3.5	Ç – 0,7	T – 0,3	-	-		
	1	3.3.6	Ç – 1,0	-	-	-		
	23	3.3.7	Ç – 0,6	T – 0,05	SB – 0,25	E – 0,1		
S -	12	3.3.8	Ç – 0,65	T – 0,2	SB – 0,1	E – 0,15		
S -	3	3.3.9	Ç – 0,55	-	SB – 0,4	E – 0,05		
	4	3.3.10	Ç – 0,85	T – 0,05	SB – 0,05	E – 0,05		
	4	3.3.11	Ç – 0,8	T – 0,1	-	E – 0,05		
	5	3.3.12	Ç – 0,9	-	SB – 0,1	-		
	7	3.3.13	Ç – 0,75	T – 0,1	SB – 0,1	E – 0,05		
	2	3.3.14	Ç – 0,75	T – 0,1	SB – 0,1	E – 0,05		
	9	3.3.15	Ç – 0,6	T – 0,05	SB – 0,1	E – 0,05	STRCT – 0,2	
STRCT – MRC -	6	3.3.16	Ç – 1,0	T – 0,05	SB – 0,1		STRCT – 0,75	
	2	3.3.17	Ç – 0,6	-			STRCT – 0,4	TTGV – 0,001
TOTAL	127							
	100%		**67%**	**7%**	**10%**	**7%**	**9%**	

Table 3.6.2 Financial Requirements of the Ministries in 2011 (In 2010 prices) (*)

	Personnel		Management	Travel	Technical Assistant		Document Production	Stakeholder Consultation	Equipment	TOTAL
	Man/ mount	Total Cost			Domestic	International				
Ministry of Environmental and Forestry	20	600.000	20.000	100.000	30.000	150.000	40.000	180.000	850.000	1.970.000
Ministry of Agriculture and Rural Affairs	2	60.000	2.000	10.000	2.000	20.000	4.000	18.000	250.000	366.000
Ministry of Health	3	90.000	3.000	15.000	3.000	30.000	6.000	27.000	850.000	1.024.000
Owners and users PCBs containing equipment	2	60.000	2.000	10.000	2.000	20.000	4.000	18.000	200.000	316.000
STRCT-MRC	3	90.000	3.000	15.000	3.000	30.000	6.000	27.000	850.000	1.024.000
TOTAL	30	900.000	30.000	150.000	40.000	250.000	60.000	270.000	3.000.000	4.700.000

(*) See Table 3.6

Abbreviations

ag: Agriculture
BAT: Best Available Techniques
BEP: Best Environmental Practices
C: capacitor
CLRTAP: Convention on Long-Range Transboundary Air Pollution
CSD: Commission for Sustainable Development
DDD: Dichloro diphenyl dichloroethane
DDE: Dichloro diphenyldichlor ethylene
DDT: Dichloro diphenyl trichloro ethane
EM: Emulsion
EMRA: Electricity Market Regulatory Authority
EMSRI: Earth and Marine Sciences Research Institute
EPA: Environmental Protection Agency
ESERI: Energy Systems and Environmental Research Institute
EU: European Union
EUAS: Electricity Generation Corporation
FAO: Food and Agriculture Organization of the United Nations
FSTRI: Food Science and Technology Research Institute
TEQ/A: gram toxic equivalent of dioxins per year
GATA: Gülhane Military Medical Academy
GATT: General Agreement on Tariffs and Trade
HCB: Hexachlorobenzene
HCH: Hexachlorocyclohexane
HPLC: High Performance Liquid Chromatography
IARC: International Agency for Research on Cancer
IE/PAC: Industry and Environment Programme Activity Centre
IFCS: Intergovernmental Forum on Chemical Safety
ILO: International Labor Organization
IOMC: Inter-Organization Programme for the Sound Management of Chemicals
IPCS: International Programme on Chemical Safety
IPPC: Integrated Pollution Prevention Control Directive
IRPTC: International Register of Potentially Toxic Chemicals
ISG: Inter-sessional Group of the Intergovernmental Forum on Chemical Safety
ISO: International Organization for Standardization
ISTAC: Istanbul Metropolitan Municipality Environmental Protection and Evaluation of Waste Materials Industrial and Trade Inc.
IZAYDAŞ: Turkish Waste Incineration Corp.
KCI: Kocaeli Chamber of Industry
LPG: Liquid Petroleum Gas
MARA Ministry of Agriculture and Rural Affairs
MCTRI: Materials and Chemical Technologies Research Institute
MENR: Ministry of Energy and Natural Resources
MENRO: Ministry of Energy and Natural Resources and Other PCB Containing Equipment User Organisations
MoEF: Ministry of Environment and Forestry
MoD: Ministry of Defence
MoF: Ministry of Finance
MoH: Ministry of Health

MoI: Ministry of Interior
MoJ: Ministry of Justice
MoIT: Ministry of Industry and Trade
MoL: Ministry of Labor and Social Security
MoLSS: Ministry of Labor and Social Security
MRC: Marmara Research Center
n: quantity of equipment
NGO: Non Governmental Organisations
NIP: National Implementation Plans
NPC: National Project Coordinator
OECD Organization for Economic Co-operation and Development
PCBs: Polychlorinated Biphenyl
PCDD/F: Polychlorinated dibenzo dioxin/furane
PCP: Pentachlorophenol
PCT: Polychloroterphenyl
PETKIM: Turkish Petrochemical Corporation
POP: Persistent Organic Pollutant
PVC: Polyvinylchloride
RSHM: Refik Saydam Hygiene Center
SIS: State Institute of Statistics
SME: Small and Medium Enterprises
SPO: State Planning Organisation
STRCT-MRC: Scientific and Technical Research Council of Turkey-Marmara Research Center
t: transformer
t/a: ton per year
TCMA: Turkish Cement Producers Association
TEDAS: Turkish Electric Distribution Co
TEIAS: Turkish Electricity Transmission Co.
TSE: Turkish Standards Institution
TTGV: Turkish Technology Development Foundation
TUBITAK: Scientific and Technical Research Council of Turkey
TUPRAS: Turkish Petroleum Refineries Co.
UFT: Undersecretariat of Foreign Trade
ug TEQ/t: microgram toxic equivalent of dioxins per ton
UNEP: United Nations Environmental Programme
UNIDO: United Nations Industrial Development Organization
UNITAR: United Nations Institute for Training and Research
USC: Undersecretariat of Customs
USFT: Undersecretariat Foreign Trade
WHO: World Health Organisation
WP: Wettable powder
WTO: World Trade Organization

Annex 1

The List of the Stakeholders

1. Turkish General Staff
2. UNIDO
3. The World Bank
4. The Ministry of Environment and Forestry
   (General Directorate of the Environmental Management)
5. Ministry of Foreign Affairs
   (Assistant Directorate of Energy, Water and Environment)
6. The Ministry of Energy and Natural Resources
   General Directorate of Turkish Electric Distribution Co. (TEDAS)
   General Directorate of Turkish Electricity Transmission Co. (TEIAS)
   General Directorate of Electricity Generation Co. (EUAS)
7. Ministry of Health
   (Refik Saydam Hygiene Center)
8. Ministry of Agriculture and Rural Affairs
   (General Directorate of Protection and Control)
9. State Planning Organization
10. Undersecretary Foreign Trade
11. State Statistical Institute
    (Department of Environmental Statistics)
12. Turkish Standards Institution
13. Scientific and Technical Research Council of Turkey
    (Marmara Research Center)
14. Turkish Chemical Manifacturirer's Association
15. Ministry of Industry and Trade
16. General Directorate of Turkish Sugar Industry
17. Turkish Technology Development Foundation