The National Implementation Plan of the Republic of Korea under the Stockholm Convention on Persistent Organic Pollutants

APR 2009

Republic of Korea

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Chapter 1. Introduction

1. The Stockholm Convention

Pursuant to Article 7 of the Stockholm Convention on Persistent Organic Pollutants (hereinafter referred to as 'the Convention'), each country must create and submit a NIP(National Implementation Plan) to the Convention Secretariat within 2 years from ratification. Furthermore, in Article 5 of the Convention, each country must create and implement an action plan on elimination or reduction of unintentional pollutants as a part of the NIP.

The items mandated by the Stockholm convention are listed in <Table 1>.

<Table 1> Items mandated by the Stockholm Convention

Item	Mandate	Notes
Elimination	Prohibition of manufacturing, usage, import/export of the chemicals listed in Annex A (9 types)	・Progressive elimination of devices containing more than 50ppm of PCBs by 2025 ・Environmentally-friendly waste management for devices containing more than 50ppm of PCBs by 2028 ・Allowing manufacturing and usage under the specific exemption program
Restriction	Restriction on manufacturing, usage, import/export of the chemical listed in Annex B (DDT)	・Allowing manufacturing and usage only for control of pests
Reduction	Reduction of emission of unintentional POPs listed in Annex C	・Application, recommendation of BAT/BEP ・Creation of a list of emission source and examination on quantity of emission
Treatment	Environmentally-friendly treatment of POPs-containing waste	・Prohibition on direct reuse of POPs-containing waste
Planning	Creation of the National Implementation Plan to comply with the mandates by the Convention	・Create and submit within 2 years of ratification

It is expected that international collaboration on executing the measures stipulated in the Convention, based on implementation of the NIP of each country, will accelerate the elimination of Persistent Organic Pollutants (hereinafter referred to as 'POPs'), which in turn will protect the environment and human health.

2. POPs issues and control measures

POPs management in Republic of Korea (ROK) began in early 1969 with the revised Agricultural Chemical Control Act, which mandated "permission to use or sell toxic agricultural chemicals". With the revised law in place, the focus on the Agricultural Chemical Control Policy shifted from minimizing damage of crops to protecting the human health by the indiscreet use of toxic and bioaccumulative chemicals such as Chlordane and DDT.

In 1990, regulation on banning the manufacturing, import/export and usage of such chemicals for reasons other than agriculture was created under the Toxic Chemical Substance Control Act.

PCBs have been widely used in transformers, condensers and heat transmission oil due to its characteristics of chemical stability and insulating properties. However, as cases of environmental pollution where PCBs have been observed in fish and birds started to unveil, a regulation on banning the use of PCBs was stipulated in the Electric Business Act in 1979. Furthermore, in 1991, waste containing PCBs were classified as designated waste which requires High Temperature Incineration Method for the treatment. However, as such method of treatment was found to discharge dioxin, the waste was in part sent to a treatment companies overseas that were equipped with the adequate facilities. Although some chemical treatment facilities and cleansing treatment facilities have been built, much of the waste transformers and PCBs-containing waste are still in storage, as the treatment capacity is still far of lacking. As such situation call for the concerns about illegal treatment or secondary pollution.The Ministry of Environment, civic groups and power generation companies have gathered to sign the "Voluntary agreement to eliminate PCBs" in July 2004 and the POPs Control Act was created and went into effect on January 2007 for the national implementation of the Stockholm Convention.

Dioxins in the gas emitted from waste incinerators arose as an environmental issue in the 1990s, which led to the enactment of the Waste Control Act of 1997 that stipulated the maximum release limit and strengthened management for Dioxins. The efforts on the control of waste treatment facilities started to reduce the emission of Dioxins, while the industrial facilities in turn emitted more Dioxins in relevant terms.

As a countermeasure, the Ministry of Environment has signed “Voluntary agreement to reduce dioxin emission” in July 2005 with major businesses with high level of emission, civic groups and experts in the field as an effort to induce voluntary reduction emission by the companies. In addition, Dioxins monitoring project began from 2001 to measure the level of Dioxins in industrial facilities and “National dioxins emission inventory” was announced for the first time in October 2005. Based on the Dioxins monitoring project, the level of Dioxins emitted was evaluated and the maximum release limit for Dioxins in each industry was prescribed in the POPs Control Act. The act also stipulated the criteria for the treatment of other types of waste such as dust and sludge.

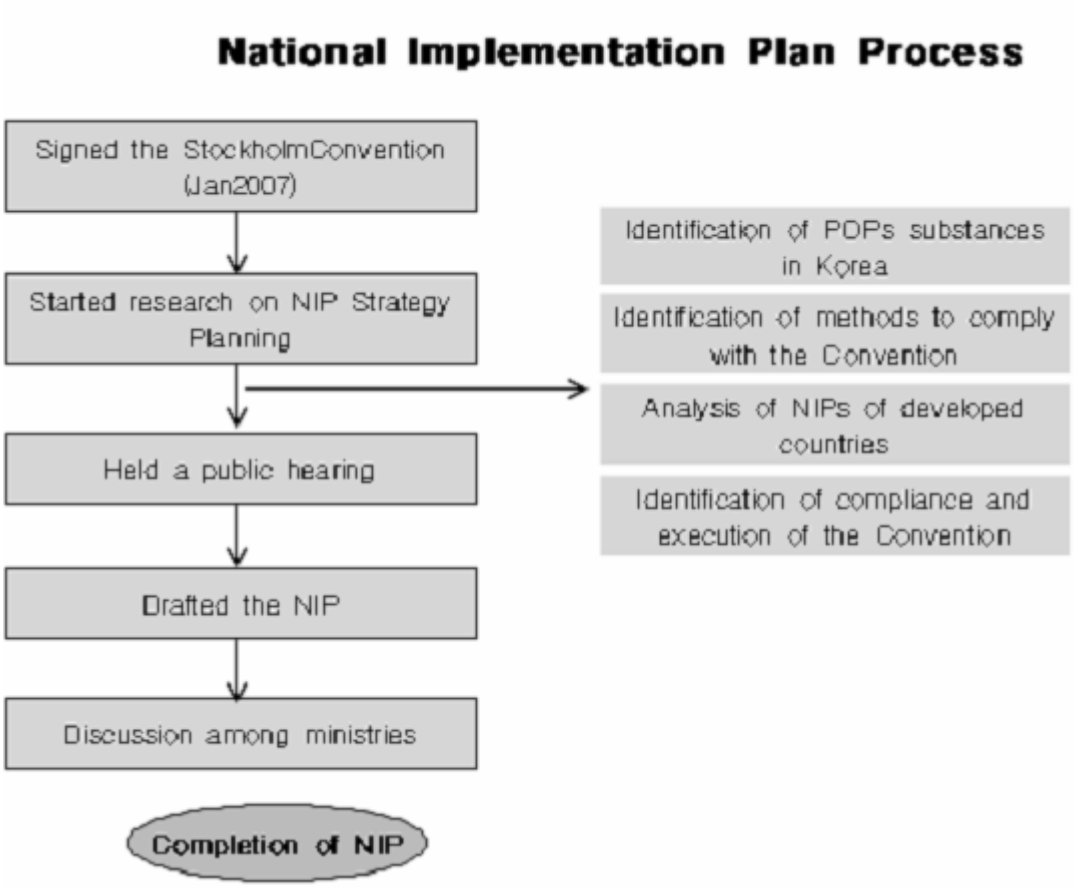
Furthermore, the level of persistence of POPs in the air, water, soil and river sediment has been monitored to identify POPs pollution since 1999. The location and time for the monitoring are described in the POPs Control Act, based on the operation of the POPs monitoring network.

3. Procedures for the development of the National Implementation Plan

After signing the Convention in October 2001 in order to protect the Korean people and their property from the risk by POPs, ROK became an official signatory of the Stockholm Convention (submitted the ratification) in January 2007. Also, in order to manage POPs more systematically under the Convention and to set national strategy for the control and reduction of POPs, "research on strategy setting for the creation of the National Implementation Plan under the Stockholm Convention" was conducted.

Based on this research, National Implementation Plan (NIP draft) that includes the characteristics of ROK and the feasibility of implementation has been created and public hearing was held to gather opinions from the industries, civic groups and other parts of the society.

The NIP was created in collaboration with the relevant ministries.



<Figure 1> Process for the development of the National Implementation Plan

Chapter 2. National Profile of ROK

1. Geographical Characteristics

1) Location and territory

ROK is a nation that consists of a peninsula that extends from the northeastern part towards the southwest of the Asian continent and about 3,200 islands. The nation is surrounded by Japan in south and open to the southeast and the Pacific Ocean to the east.

The country's total area is approximately 221,000㎢, of which South Korea takes up 45% among total Korean Peninsular area of 99,700㎢. The area of the continental shelf including tidelands spans 500,000㎢(345,000km^2 for South Korea), of which 80% is situated along the west coast, The continental shelf area is larger than double the total area of the land.

ROK is located at the latitude and longitude denominations of 33°N 43°N and 124°E 132°E respectively, and the 4 extreme points of the territory are tabulated in <Table 2>.

<Table 2> Territory of the Republic of Korea

Azimuth	Location	Coordinates
Easternmost Point	Easternmost Point, Dok-do, Ulleung-gun, Gyeongbuk	131°52'42"E
Westernmost Point	Westernmost Point, Mara-do, Yongcheon-gun, Pyeongbuk	124°11'0"E
Southernmost Point	Southernmost Point, Mara-do, Jeju Special Self-Governing Province	33°06'40"N
Northernmost Point	Northernmost Point, Yupo-jin, Onseong-gun, Hambuk	43°0'39"N

<Figure 2> Map of Korea

2) Topography

Although 70% of the land in Korea is mountainous, the mountains are not very high and two tilted topographies are formed around the Taebaek Mountains and the Hamgyeong mountains. Low mountains that are around 500 1,000m above sea level account for 20% and the hilly mountains that are 200~500m above sea level account for 40% of the total land. The average altitude of the Korean peninsula is 482m, which is much lower than the Asian average altitude of 960m.

The terrain shows a typical high-east, low-west trait where the east side is made of steep slopes and the west and south side are gentle slopes. The Baekdudaegan(Baekdu Great Mountain Chain) runs north to south along the east coast consisting of Seorak Mountain, Odae Mountain, Sobaek Mountain and Jiri Mountain and the further southern region of farmland on eroded plains. Due to such geographical characteristics, large rivers run gently in the west and south coasts and rapid and short creeks are developed in the east coast area.

The total length of the coastline is about 11,352km (island included) where the three sides of the peninsula show distinctively different characteristics. 66% of the stratum was formed in the Cenozoic era and granite and gneiss account for more than 70% of the country rock.

3) Climate

Korea has four distinctive seasons of spring, summer, fall and winter, as it is located at the mid-latitude temperate zone.

Due to its location in the Far East of the Asian continent and the far west of the Pacific Ocean, it has the characteristics of a monsoon climate as it is highly affected by seasonal wind. In the summer, the North Pacific anticyclone affects the peninsula, and in the winter, the Siberian anticyclone, which contributes to the monsoon climate characterized by high temperature and high humidity in the summer and cold and dryness in the winter.

The annual average temperature is 10~16℃, with an exception of the mountainous areas in the middle part of the peninsula and the average temperature in the hottest month of August is 23~27℃. Temperature in May averages around 16~19℃, 11~19℃ in October and -6~-7℃ in the coldest month of January, respectively. (Based on the data for 60 observation points, 20-yr continuous observation, average data for 1971~2000).

Annual precipitation is about 500 1,500mm(1,274mm in South Korea, less than 1,000mm in North Korea) and the national average is 1,190㎜. The precipitation in the southeastern coastal area is heaviest at around 1,500㎜, the area that experience the highest precipitation is the southeastern coast of Jeju Special Self-Governing Province with 1,800㎜. Ulleungdo is another area with high annual precipitation of 1,400㎜. 60% of rain falls in the summer, whereas the level of precipitation is quite low in the winter due to the northwester seasonal wind. Precipitation per person is only 9% of the world average (34,000 Ton) which is reported around 3,000 Ton.

The humidity is higher by 15~20% in the west coast compared to the east coast in the same latitude. The East Sea is deeper than the Yellow Sea; therefore, there is less difference in temperature all year long. Thus, the east coast is warmer and has lower relative humidity than the west coast.

2. Population

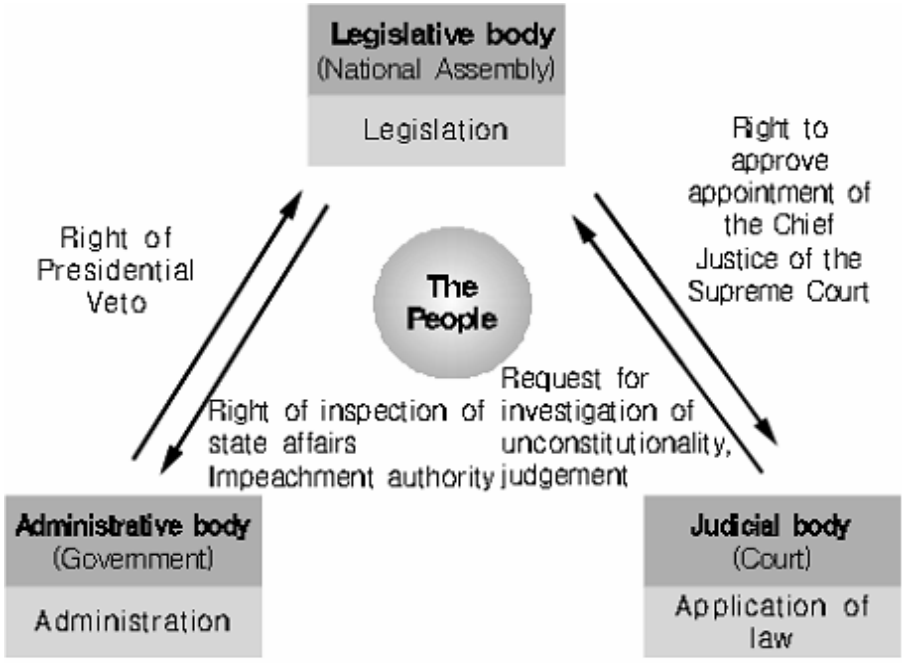
The population of ROK as of 2007 is at 48,456,000 with 24,344,000 men and 24,112,000 women. The women to men ratio are 1.009. The population growth rate has been continuously decreases as the rate of 1.88% in 1970, 1% in 1985 and 0.32% in 2005~2006.

The population of ROK accounts for 0.77% of the world population, based on 2002 statistics and the population density is very high at 481 persons/㎢.

3. Status of politics

1) Separation of three powers

The government of ROK is divided into three parts: legislative, administrative and judicial, which allows each part to keep checks and balances whereby each branch can further develop, prevent each other from intervention, and ultimately protect the basic rights of the people to ensure democracy, as depicted in Figure 3.



<Figure 3> Separation of three powers

The organizational chart for the current government is as follows.

<Figure 4> The ROK government organization chart

Source : The Blue House (Cheongwadae) homepage
(http://www.president.go.kr/kr/cheongwadae/organization/government.php)

2) Form of government

The ROK government has a presidential system that is based on the principle of popular sovereignty and constitutional state. ROK has adopted the presidential system from 1948 to 1960, and then temporarily adopted the parliamentary cabinet system in 1960, but from 1962 up to now, the presidential system has been settled down.

3) Status of the local governments

Local governments have the authority within a certain region as defined by the law. The constitution of ROK guarantees local autonomy and the organization and operation of local governments as is in the law.

There are two types of local governments, general and special (local associations). General local governments are classified into upper local governments (special city, metropolitan city and province) and lower local governments (city, and autonomic district).

Each of local autonomy has a legislative body, an administrative body with the head of the local economy, an assisting body (vice governor, administrative agencies and etc), affiliated administrative body (may set up an attached body, office, branch office or a consensus-based administrative body), and sub administrative bodies.

The metropolitan autonomy consists of total 16 cities and provinces (1 special city, 6 metropolitan cities and 9 provinces) and the basic autonomous body consists of 234 cities, with local provinces (77cities, and 157 local provinces).

4. Status of the economy

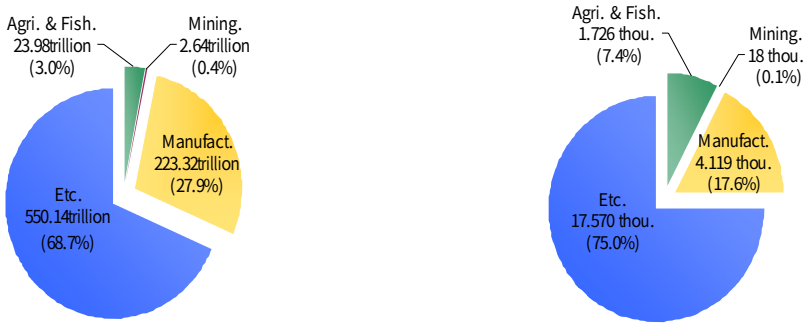
1) GDP

The GDP of ROK recorded 969.9 Bn USD, GNI of ROK was 971.3 Bn USD and the per capita GNP was 20,045 USD as of 2007. The real growth rate of 2007 was 5.0% and the GDP ranking is approximately 13th in the world.

2) Economic structure

The ROK economy has enjoyed a fast growth rate thanks to rapid accumulation of capital that began with the industrialization in the 1960s. The annual growth rate between 1970 and 1980 hovered around 10% and in the 1990s, rapid growth in the IT industry took place thanks to the revolutionary development of IT technology.

Investment on IT industries had increased as awareness on advanced technology grew. As a result, the industrial structure was shifted from the light industry in the 1970s to heavy and chemical industries in the 1980s and since the 1990s, electronics and IT became the pillars of the ROK economy along with heavy and chemical industries.



(unit: KRW) (unit: people)

<Figure 5> Economic indicators by industry

Source : Bank of ROK, National Accounts quarterly No.3 2008

<Table 3> Details on the number of employees by industry

Industry	2006	
	No. of companies	No. of employees
Agriculture and Fisheries	3,997	33,869
Agriculture	3,657	31,427
Fisheries	340	2,442
Mining and manufacturing	116,643	2,925,955
Mining	570	14,660
Coal, crude oil and uranium mining	58	5,553
Metal mining	5	139
Non-metal minerals mining; excluding mining for fuel	507	8,968
Manufacturing	116,073	2,911,295
Beverage and food manufacturing	8,141	187,896
Tobacco manufacturing	5	2,628
Textile manufacturing; excluding sewing and garments	8,401	139,556
Sewing garments and fur products manufacturing	8,371	112,053
Leather, bags and shoes manufacturing	1,908	29,167
Wood, wooden products manufacturing; excluding furniture	2,011	26,026
Pulp, paper and paper products manufacturing	2,992	58,727
Publishing, printing and recording medium business	6,164	99,562
Cokes, refined petroleum products and nuclear fuel manufacturing	110	10,119
Compounds and chemical product manufacturing	4,002	147,214
Rubber and plastic product manufacturing	8,864	200,464
Nonmetallic mineral product manufacturing	3,947	85,774

Industry	2006	
	No. of companies	No. of employees
Primary metal industry	2,976	120,736
Assembled metal product manufacturing; excluding machinery and furniture	14,894	259,147
Other machinery and equipment manufacturing	16,113	326,313
Computer and office device manufacturing	816	24,410
Other electric machinery and electric converter manufacturing	6,260	143,228
Electronic components, imaging, audio and communication devices manufacturing	5,106	400,924
Medical, precision, optical devices and watch manufacturing	3,190	61,546
Automobile and trailer manufacturing	3,942	266,991
Other transportation equipment manufacturing	1,244	120,820
Furniture and other products manufacturing	6,157	81,369
Recyclable processing material manufacturing	459	6,625

Source: ROK Statistical Information Service (http://www.kosis.kr/)

Chapter 3. POPs control measures in ROK

1. POPs control in relevant ministries

Four ministries are involved in the control of POPs in ROK, which are The Ministry of Environment, Ministry of Land Transport and Maritime Affairs, Ministry for Food, Agriculture, Forestry and Fisheries and Korea Food & Drug Administration. Among them the Chemicals Management Division at the Environmental Strategy Office under the Ministry of Environment is in charge of the overall management of POPs control in ROK. Each of ministries operates subsidiary institute: National Institute of Environmental Research (NIER), National Fisheries Research and Development Institute, National Academy of Agricultural Science and National Institute of Toxicological Research, respectively. Table 4 illustrates the roles of each ministry.

<Table 4> Roles of the ministries in POPs-related projects

Ministry (Institute)	Role
Ministry of Environment (National Institute of Environmental Research)	・Study on POPs status of environmental media and their management such as air, water, sediment, soil and waste. ・Study on status of emission of unintentional POPs and POPs-containing waste and their management
Ministry of Land Transport and Maritime Affairs (National Fisheries Research and Development Institute)	・Study on status of seawater, submarine sediment and marine life and their management
Ministry for Food, Agriculture, Forestry and Fisheries (National Fisheries Research and Development Institute, National Academy of Agricultural Science)	・Study on status of veterinary medicine, agricultural chemicals, livestock and farmlands and their management
Korea Food & Drug Administration (National Institute of Toxicological Research)	・Food and drugs, research on toxicity and impacts on the human health and their management

1) Ministry of Environment

The Ministry of Environment has created the inventory on unintentional POPs (Unintentional Persistent Organic Pollutants, hereinafter referred to as 'UPOPs'), and performed a control policies for PCBs, endocrine disruptor and POPs.

Examination on the major emission sources of dioxin and PCBs began in 2001 in order to create a UPOPs inventory. Examination on HCB has been under way since 2005.

In an effort to eliminate PCBs, the Ministry of Environment, Korea Electric Power Corporation [1](hereinafter referred to as 'KEPCO'), KEPCO's subsidiary power plants[2] and civic groups have voluntarily signed agreements, organized a PCBs policy council and PCBs safety evaluation group to monitor usage and stockpiles of PCBs and embarked on research projects for PCBs disposal.

The PCB policy council has executed researches such as "Research on the status of POPs control and countermeasures", "Research on POPs-containing products and wastes control plans", and "Research on standard for UPOPs emission by industry", and conducted "Research on strategy setting for the National Implementation Plan under the Stockholm Convention" to draw up the basic POPs control plan under the Convention.

In order to investigate POPs level in the environment, the Ministry of Environment has implemented POPs monitoring in media such as air, water, soil, etc., and surveyed emission sources and their impacts on the vicinity since 1999 (see Table 5).

[1] Korea Electric Power Corporation, a government-invested corporation that is in the business of power distribution and power transmission in Korea as well as overseas power plant projects, is the largest user of insulating oil-containing equipments such as transformers.

[2] There are 5 thermal power plants and 1 nuclear power plant in Korea.

<Table 5> Overview of POPs examination and research led by the National Institute of Environmental Research

Name and duration of project	Project details	Project Outcome
Examination on persistent pollutants in the air (‘99 ~ present)	Survey on persistence level of Dioxin, HCB, Co-PCBs in the air during the 4 seasons	- Examination target: 3 types of unintentional POPs (Dioxin, HCB, Co-PCB) - Number of points of examination: 15~35 points each year
Examination on persistent pollutants in the environment (‘99 ~ ’07)	Survey on POPs persistence level in soil, water and sediment (biannual)	- Examination target: POPs 10 types (excluding Toxaphene and Mirex) - Number of points of examination: 59~94 points each year
River sediment POPs concentration level monitoring (‘05 ~ ’08)	POPs persistence chronicle survey on the surface and bottom sediment of the 4 main rivers	- Points of examination: Han River(‘05), Nakdong River(‘06), Geum River(‘07), Youngsan River/Seomjin River(’08)
Evaluation on emission source and contribution rate (‘05 ~ ’06)	Assessment of contribution of dioxins emitted into the air and the major emission sources	- Assessment of emission ratio and contribution rate in industrial areas by the type of industry
Development of POPs process test method (‘06 ~ ’07)	Research on preparation of process test method for POPs chemicals by medium	- Announcement of POPs test process criteria

The Ministry of Environment has applied the Hazardous Chemicals Control Act enacted in 1990 for the management POPs until the POPs Control Act, an integrated law on POPs prepared for the Convention has been enacted and promulgated on Jan 27 2008. The content of the POPs Control Act is tabulated in <Table 6>.

<Table 6> Key contents of the 'POPs Control Act'

Article	Key contents	Relevance with the Convention
Article 5	- POPs Control basic plan 丶Financing plan for Control 丶Plan for cooperation with international organizations and national and international agencies	(Article 7) Implementation Plans
Article 11	- Establishment and operation of monitoring network 丶Survey on POPs contamination in the air, water, soil, river sediment and organisms	(Article 11) Research, development and monitoring
Article 13	- Prohibition or restriction on manufacturing, import/export and usage of POPs	(Article 3) Measures to reduce or eliminate POPs
Article 14	- Maximum release limit for UPOPs	(Article 5) Measures to reduce or eliminate UPOPs
Article 18	- Survey on emission source and quantity of UPOPs	(Article 11) Research, development and monitoring
Article 19	- Monitoring of UPOPs and survey on impact in the vicinities	(Article 11 of the Convention) Research, development and monitoring
Article 21 ~ 23	- Classification and Control of POPs-containing waste - Treatment criteria for POPs-containing waste - Restriction on recycling of POPs-containing waste	(Article 6) Measures to reduce or eliminate POPs wastes
Article 24 ~ 26	- Creation of a inventory of POPs-containing devices - Safe Control of POPs-containing devices - Treatment limit for POPs-containing devices	

2) Ministry for Food, Agriculture, Forestry and Fisheries

The Ministry for Food, Agriculture, Forestry and Fisheries controls the use of POPs-containing agricultural chemicals of which the production, manufacturing, import/export are prohibited under the Stockholm Convention. The National Academy of Agricultural Science under the Ministry for Food, Agriculture, Forestry and Fisheries has conducted a joint research on “Exposure to POPs and its hazard” with the National Institute for Agro-Environmental Sciences of Japan from 1996 and also worked on research projects such as “Establishment of high resolution mass spectrometer analysis method for POPs”, “Assessment of persistence of POPs chemicals using high resolution mass spectrometers” and “Research on mobility of POPs from the contamination area to crops” for 3 years. Most of the monitoring took place in rice paddies, crop fields and orchards that were representative farms in the vicinity. The results showed that POPs chemicals were virtually non-existent in the farming areas or measured in extremely little quantities.

3) Ministry of Land Transport and Maritime Affairs

The Ministry of Land Transport and Maritime Affairs has been conducting periodic examination on the environment of coastal areas and neighboring waters and performed research on "endocrine disruptors" in the marine ecosystem, creating the policy for marine environment control and preservation including the control of POPs since 2002.

As a part of the “National marine environment monitoring network project”, PCB and TBT examinations of the sea water are conducted for the pollution evaluation. Monitoring of dioxins, PCBs and organochlorine chemicals is also conducted on submarine sediment and bio indicators. More projects include “Research on persistence in fisheries”, “Research on route of inflow and movement within the marine ecosystem” and “Research on impact on organisms”.

Monitoring of contamination in the marine environmental media is being conducted at the 25 points around the country such as Jinhae and Ulsan Bays. Biomarkers are used for the assessment of impact on fisheries in the contamination-prone coast as a part of the “Research on impact on marine organisms”. Furthermore, new biomarker development projects are also on progress to improve assessment of impact on organisms. The National Health & Nutrition Monitoring is used as a basis for the monitoring of most consumed fisheries for the evaluation of the POPs levels.

In addition, the Ministry has enacted and promulgated the Marine Environment Control Act in 2007 to create a legal basis for the criteria for process testing of POPs in the marine environment, control targets for the submarine sediment and operation of the POPs monitoring network.

4) Ministry for Health, Welfare and Family Affairs (Korea Food & Drug Administration)

The Korea Food & Drug Administration (KFDA) under the Ministry of Health, Welfare and Family Affairs is in charge of POPs related projects. KFDA mainly focuses on monitoring of POPs in food and risk profile evaluation.

The Food Contamination Substance Division has been conducting Dioxins monitoring and risk profile evaluation on food since 2000 and PCBs have been added to the list in 2002. As a result, it was identified that the concentration level of Dioxins and PCBs in foodstuffs in ROK was similar or lower than the level of other countries and no risk profile was found.

Foodstuffs that were thought to have relatively high concentration of Dioxins and those that were consumed the most by adults were selected as samples based on the National Health Survey. A test conducted in 2001 on vegetables and fruits indicated that there were no Dioxins and PCBs since 2001, most of the tests have been focused on highly consumed meat, fish and poultry.

The Food Persistent Chemical Division is in charge of monitoring persistent agricultural chemicals in foodstuffs. Since the first monitoring in 1968, the type of chemicals and the number of foodstuffs for testing has continuously increased. Monitoring efforts are mostly concentrated on highly consumed foodstuffs such as grain, vegetables and fruits. Results of the monitoring are used as basic data for food hygiene policy and risk profile evaluation.

In addition, KFDA has been carrying out a monitoring research project on “Endocrine disruptors in foodstuffs and human samples are using breast milk” since 1999. The results show that the PCBs concentration level in breast milk is much lower than developed countries.

2. Status of intentional POPs control

2-1. Status of POPs agricultural chemical control

POPs agricultural chemicals stipulated in the Convention are; 8 types listed in Part 1 of Annex A, Aldrin, Chlordane, Dieldrin, Endrin, Heptachlor, Hexachlorobenzene, Mirex, Toxaphene and 9 types, listed in Annex B including DDT.

1) Status of POPs agricultural chemical distribution

Among the 9 agricultural chemicals listed in the Convention, Mirex and HCB have never been imported to ROK. The registration of the remaining 7 types that were once used in ROK 30~40 years ago (Aldrin, Dieldrin, Endrin, Chlordane, Heptachlor, Toxaphene and DDT) has been enforced according to the Agricultural Chemicals Control Act and the Hazardous Chemical Substances Control Act. Their distribution has been completely banned (Table 7). The distribution of Mirex and HCB also was prohibited under the POPs Control Act.

<Table 7> Status of POPs agricultural chemicals registration and rescission

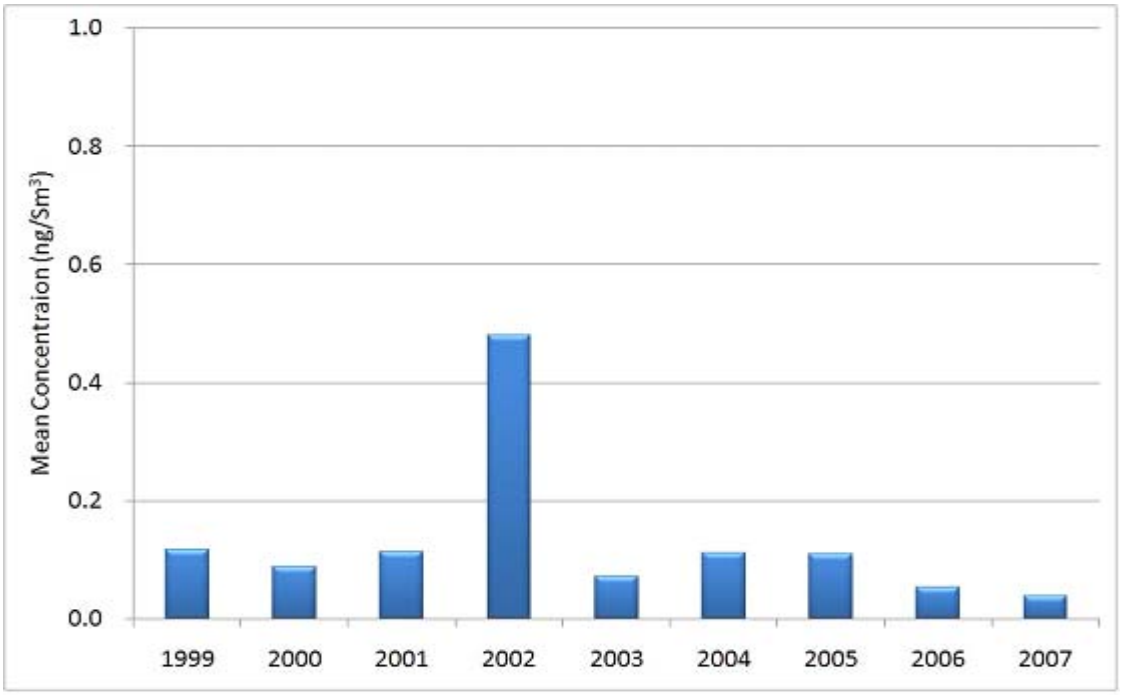
		Regulation in ROK	
Name of chemical	**Annex**	**Agricultural chemicals control act**	**Hazardous chemical substances control act**
Aldrin	A	Registration revoked/prohibited ('72)	Prohibited (0.1%)('99)
Chlordane	A	Registration revoked/prohibited ('77)	Prohibited (1%)('99)
Dieldrin	A	Registration revoked/prohibited ('70)	Prohibited (1%)('99)
Endrin	A	Registration revoked/prohibited ('69)	Prohibited (1%)('99)
Heptachlor	A	Registration revoked/prohibited ('79)	Prohibited (6%)('99)
Mirex	A	Usage prohibited (POPs Control Act, ('08)	
Toxaphene	A	Registration revoked/prohibited ('82)	Prohibited (1%)('91)
HCB	A	Usage prohibited (POPs Control Act, ('08)	
DDT	B	Registration revoked/prohibited('71)	Prohibited (1%)('91)

2) Impact of POPs agricultural chemical on human health and the ecosystem

Although there is no survey conducted exclusively on the impact of POPs-containing agricultural chemicals on environmental medium and the ecosystem, the "Mid- and Long-Term Endocrine Disrupter Research Plan (1999~2008)" includes dealing with POPs-containing agricultural chemicals. Under the plan, various research projects on POPs-containing agricultural chemicals are under way at relevant ministries. The plan was jointly established by the relevant ministries in July 1999.

(1) Persistent pollutants in environment

Since 1999, intensive persistence examination of endocrine disruptors including the 10 POPs stipulated in the Convention has been carried out. During the examination period, 2 chemicals, Dioxins and HCB have been periodically monitored in all environmental media. Results showed that agricultural chemicals were found in the soil. Although HCB has been detected in the air, it is assumed that HCB has been discharged as a by-product, since HCB has never been used as an agricultural chemical in ROK.



<Figure 6> Trend of average HCB concentration in the air

※ Source : National Institute of Environmental Research endocrine disruptor research report(2007)

The Ministry of Land Transport and Maritime Affairs is carrying out extensive researches on persistent pollutants (including 12 POPs) in the marine ecosystem and POPs agricultural chemical on 5 types of submarine sediments and marine life. Any of Aldrin, Dieldrin or Heptachlor have not been detected in sediments and living organisms so far. According to the DDT monitoring results on national coasts that started in 2001, Detected values of DDT concentrations in living organism have been higher than those in sediments. 2006 and 2007 results showed a 100% DDT detection rate in living organisms.

<Table 8> DDT concentration of sediments in the national coasts

Substance	Year	2001	2002	2003	2004	2005	2006	2007
DDTs	Detection rate (%)	75	60	40	20	80	84	92
	Concentration (ng/g dry wt.)	0.03~1.84 (0.43)	0.09~2.24 (0.40)	1.23~7.22 (1.17)	1.34~22.59 (1.41)	0.08~11.15 (1.45)	0.07~15.56 (1.09)	N.D~6.74 (1.06)

※ Numbers in ( ) indicates the average value
※ Source : Ministry of Land Transport and Maritime Affairs, Marine environment POPs contamination monitoring report (2008)
※ Detection rate : (No. of detected Samples / Total No. of samples) × 100

<Table 9> Concentration distribution of DDT of bivalvia in the national coasts

Substance	Year	2001	2002	2003	2004	2005	2006	2007
DDTs	Detection rate (%)	65	68	68	72	76	100	100
	Concentration (ng/g dry wt.)	N.D~3.42 (0.85)	N.D~8.05 (1.67)	N.D~18.75 (4.35)	N.D~33.91 (5.99)	N.D~47.20 (8.12)	0.47~11.41 (3.90)	0.53~7.91 (3.73)

※ Source : Ministry of Land Transport and Maritime Affairs, Marine environment POPs contamination monitoring report(2008)
※ Detection rate : (No. of detected Samples / Total No. of samples) × 100

(2) Persistent pollutants in foodstuffs

Korea Food & Drug Administration (KFDA) has been conducting the "Project on monitoring persistent agricultural chemicals in foodstuffs" since 1968 in order to secure the safety of all agricultural products sold in ROK. Results showed that most of the foodstuffs did not contain persistent agricultural chemicals or less than persistence level, where tests were conducted by the risk profile evaluation method as prescribed in the Food Sanitation Act. Note that no agricultural chemicals have been detected during the monitoring period.

(3) Persistent pollutants in human body

The Division of Human Exposure Evaluation at the National Institute of Toxicological Research is currently measuring contamination levels for the 9 agricultural chemicals listed in the Convention. Researches of "the 4th POPs monitoring project in breast milk" and "a trend in POPs exposure" will be on progress for 4 ~ 5 years. In addition, blood monitoring is carried out for the identification of the 9 chemicals in human body. Results will be used as a basis for POPs risk profile evaluation to human body.

3) Control policy and measures

The 9 POPs control measures in ROK is carried out in order to block the sources by prohibiting the manufacturing, import/export and usage of such chemicals. Agricultural Chemicals Control Act, Hazardous Chemical Substance Control Act and POPs Control Act are the major control policies.

4) Compliance of the convention

Article 3 of the Convention on POPs agricultural chemicals should be strictly complied. The manufacturing, distribution and usage of the 9 POPs agricultural chemicals listed in the Convention are prohibited pursuant to Article 15 of Agricultural Chemicals Control Act and Article 13 of POPs Control Act.

Article	Description	ROK Law
Article 3	Elimination or restriction on POPs agricultural chemicals pursuant to Annex A and B	Manufacturing, distribution and usage on the 9 agricultural chemicals stipulated in Annex A and B of the Convention are prohibited pursuant to Article 15 of the Agricultural Chemicals Control Act and Article 13 of the POPs Control Act

2-2. Status of POPs-containing equipment control

1) Status of equipment control

The Ministry of Environment has started practical actions for the control of equipments designated in the 'POPs Control Act' such as transformers and condensers in order to manage PCBs-containing wastes. Under the Act, those who own such equipment must report the following information to the mayor/governor; name of the equipment manufacturer, date of manufacturing, change of insulating oil, PCBs concentration analysis (transformers), capacity and total weight. Furthermore, equipment with PCBs concentration of more than 50mg/L will be categorized as contaminated equipment, which requires safety management indication. Change of insulation oil must be reported to the mayor/governor.

In case of equipment with PCBs concentration of more than 2mg/L, the treatment measures must comply with the 'POPs Control Act'. Waste insulation oil in equipments with PCBs concentration of less than 2 mg/L may be recycled as a refined fuel, and the remaining metal may be reused for purposes other than electric transformers

2-3. POPs-containing waste treatment status

1) Overview

The Convention stipulates 12 POPs containing wastes. The POPs- containing wastes listed in Article 3 of the POPs Control Act include dioxin-containing waste, PCBs-containing waste and POPs agricultural chemical wastes. The threshold for POPs content is 100pg-TEQ/L for dioxin in liquid form and 3ng-TEQ/g for dioxin in solid. The threshold for PCBs content is 0.01 mg/L for liquid and 0.0001 mg/L for solid.

Since the manufacturing and usage of agricultural chemicals in ROK have been prohibited since the 1970s, no POPs-containing waste has been generated. POPs-containing wastes requiring precaution are PCBs used in transformers.

2) Control of Import/Export of PCBs-containing wastes

In ROK, facilities that do not have the appropriate technology to treat waste as prescribed in the 'Act on the Control of Transboundary Movements of Hazardous Wastes and Their Disposal' may export wastes for the proper treatment. Provided that, the waste is needed as a recycled industrial material in the importing country, agreement should be granted from the importing country as well as the transit country. Approval should be required from the Minister of Environment. However, the law does not allow import or export of wastes that may have risk on the health of the human body and environment.

The export of PCBs-containing wastes such as waste transformers are prohibited in ROK. Currently 6 high-temperature waste incinerators for PCBs, 2 for chemical and 1 for cleansing facilities are in operation.

3) Generation and treatment of PCBs-containing wastes and outlook

The major sources of PCBs-containing wastes are oil-type transformers, oil-type condensers, oil-type potential outfits and power generation devices that use electric insulating oil as an insulating medium. In addition, paper, textile and plastic which used for PCBs-containing devices such as transformers are the sources of PCBs-containing wastes.

Some of oil-type transformers are managed by KEPCO, while others are bought, installed and managed by end-users. Oil-type transformers managed by KEPCO are replaced every 13 years and 294,529 units of waste transformers were discharged by KEPCO in the last 5 years (2000~2004). The annual average of discharge was 58,906 units.

PCBs-containing wastes are generated after the discharge of the waste transformers. Since PCBs contents in insulating oil in transformers are unavailable. It is difficult to estimate at this point how much PCBs-containing wastes would be generated. Currently, the number of transformers managed by users other than KEPCO, such as railway facilities, private and public schools, are being identified.

Since it has become obligatory to report[3] devices that require precaution the

[3] Information for reporting; 1) Name of manufacturer, date of manufacturing 2) capacity and

POPs Control Act effective in 2008, it is expected that all devices that require precaution will be identified in 2009.

Waste transformers with PCBs content of more than 2mg/L must be treated according to the standard criteria for treatment as in Article 22 of the POPs Control Act. The waste treatment facilities that are licensed to treat PCBs-containing wastes must comply with the POPs Control Act.

Up to now, PCBs-containing wastes have been treated by high-temperature incinerating or high-temperature melting only. However, new methods of treatment have been added. It includes chemical treatment and cleansing as prescribed in the POPs Control Act and methods that are technically verified by Article 7 of the Environmental Technology Development and Support Act. It is expected to accelerate the proper treatment of such chemicals with keeping the permission process.

4) Status of PCBs-containing wastes control policy and system

In ROK, an Agreement for Elimination of PCBs[4] has been promulgated and PCBs Policy Council[5] has been set up to establish policies for the elimination of PCBs. Although the agreement stipulates that PCBs containing wastes (>0.005%, 50 ppm for liquid form) must be eliminated by 2028, the major dischargers of PCBs-containing waste; KEPCO and its 6 subsidiaries, civic groups and the Ministry of Environment has set a target to eliminate PCBs.

In addition, "Roadmap for PCBs elimination" has been established. The roadmap outlines the efficient policies and projects that need to be implemented for the next 10 years in order to eliminate PCBs contamination. The following is the step-by-step plan to eliminate PCBs in ROK.

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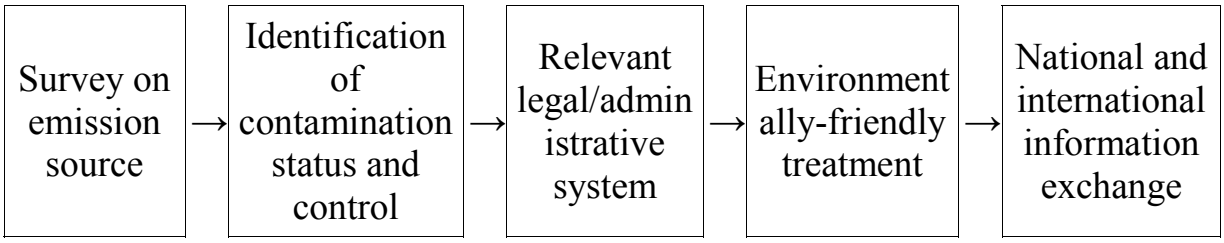
total weight of the designated equipment 3) quantity of insulating oil, insulating oil change 4) PCBs concentration (transformers only)

[4] An agreement signed on Oct 7 2004, by KEPCO and its 6 subsidiaries, civic groups and the Ministry of Environment to eliminate PCBs

[5] A council comprised of industries, environmental groups and the government working under the goal of creating and implementing safe management and treatment policies for PCBs-containing waste.



Currently, PCBs-containing waste management is controlled both by the Wastes Control Act and the POPs Control Act. In Article 3 of the enforcement decree of the Wastes Control Act, PCBs-containing waste is stipulated as designated waste and in the enforcement decree of Article 3 of the POPs Control Act, waste containing more than the maximum release limit for PCBs is stipulated as designated waste.

With the enactment of the POPs Control Act, a framework for environmentally-friendly control of POPs from generation to treatment has been created. Since Korea is a densely populated country with high level of industry integration, waste containing more than 2 mg/L is treated as general waste and equipment with more than 50 mg/L is specially managed as contaminated equipment.

In Article 22 of the same Act, the criteria for the treatment of PCBs-containing waste are prescribed and in Article 19 of the enforcement decree the same act, possible recycling of electric devices that contain insulating oil with PCBs concentration level of less than 2mg/L is described that waste insulating oil can be recycled into refined fuel, material or metal inside the electric devices can be recycled into products except for electric transformers.

In addition to the existing methods of PCBs-containing waste treatment such as high-temperature incineration and melting, chemical treatment and cleansing have been added under the POPs Control Act. Other technologically verified methods also added under Article 7 of the Environmental Technology Development and Support Act.

5) Compliance of the convention

Articles 21~35 of the POPs Control Act meet the conditions for safety management for POPs-containing wastes as provided in Article 6 of the Convention.

Article	Description	Korean Policy and Law
Article 6	Reduction or elimination of emission from POPs-containing devices and waste	Reduction or elimination of PCBs emission through safe management of POPs-containing equipment or waste as provided for in Article 25 of the POPs Control Act
Annex A Part 2	Make determined efforts to manage equipment containing greater than 0.005% PCBs and liquid containing PCBs in an environmentally-friendly method by 2028	Elimination of PCBs as provided for in the Agreement on elimination of PCBs by the Ministry of Environment

3. Status of the control of unintentional POPs

The 4 UPOPs (Unintentional Persistent Organic Pollutants) stipulated in the Convention are Dioxins, Furans, PCBs and HCB. Article 2 of the POPs Control Act and Article 2 of the enforcement decree of the POPs Control Act defines unintentional POPs-emitting facilities and the maximum level of release of these facilities.

1) Status of release

Since 2001, methods have been developed for classifying the sources of Dioxins emission and calculation of the emission quantity. These techniques have been applied to survey(2001-2005) on 340 industrial facilities related to steel and non-ferrous metal and 1,800 waste incinerators. Based on the results, the first national Dioxins emission inventory was prepared. Furthermore, a plan to create a biannual Dioxins emission inventory was announced. Based on the continuous survey, the second national Dioxins emission inventory was posted in 2006.

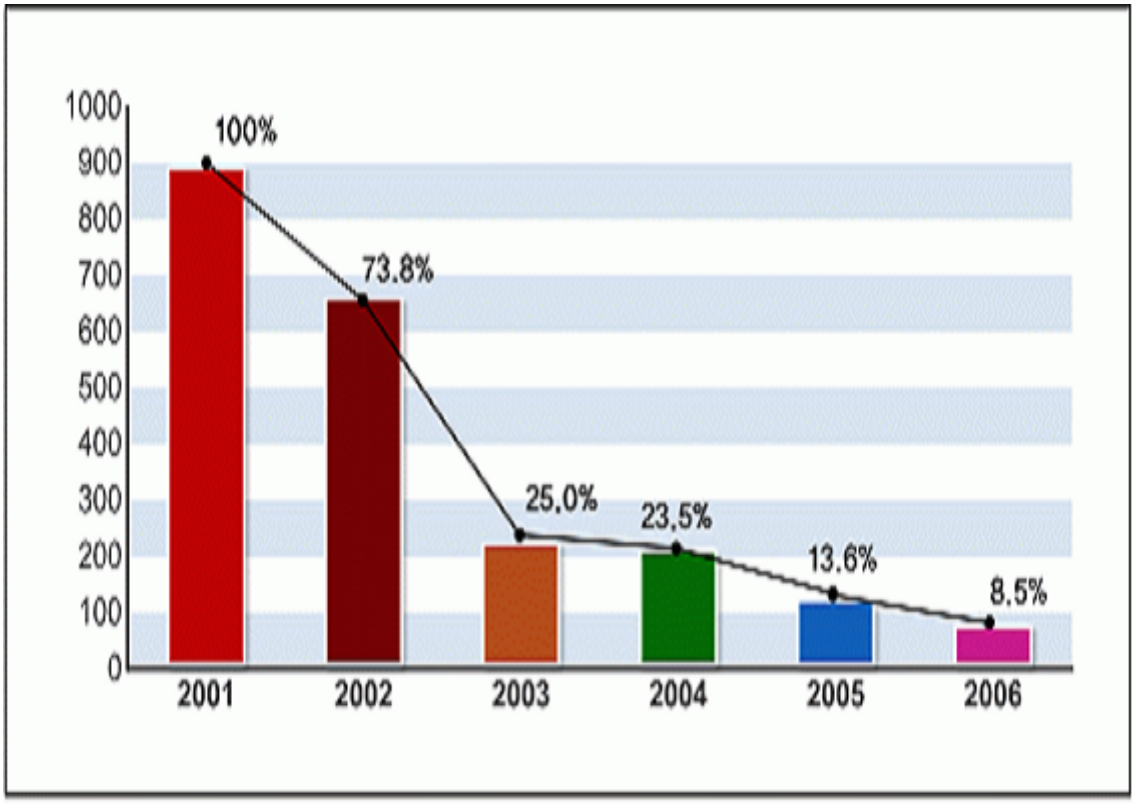
The 2001 inventory showed that 87% of Dioxins were emitted from waste incinerators. The steel industry accounts for 75% of the Dioxin emissions from non-waste incinerator facilities (13% of total emission inventory). The 2006 inventory showed reduction in Dioxin emissions from waste incinerators and their share of total emissions due to more stringent emission standards. Emissions from non-waste incinerator facilities also have been significantly reduced due to installation of more emission control facilities, such as activated carbon tower, to comply with a voluntary agreement on Dioxin reduction.

<Table 10> National Dioxins emission inventory

Category	Classification	Quantity (g-I TEQ/yr)		Environmental standard
		2001	2006	
Waste Incinerators	General waste	163.5	43.9	Annual average Lower than 0.6pg-TEQ/Sm^3
	Industrial waste	728.1	31.5	
	Total	891.6 (87.4%)	75.4 (53.7%)	
Non-Waste Incinerator Facilities	Iron and Steel industry	96.4	43.3	
	Non-ferrous metals	15.0	10.6	
	Nonmetallic mineral product manufacturing	3.1	4.5	
	Chemical product manufacturing	0.6	0.2	
	Energy industry combustion	9.8	3.9	
	Other (Crematoria, etc)	4.1	2.5	
	Total	128.9 (12.6%)	65.1 (46.3%)	
Grand Total		1,020.5	140.5	

※ Source: National Institute of Environmental Research (2005), Research on BAT and BEP of waste incinerators etc., Dioxins emission Report

Dioxins emissions from waste incinerators have decreased continuously compared to the 2001 due to constant control measures, such as the progressive strengthening of emission standards.



<Figure 7> Dioxins emission trend in waste incinerators

※ Source: National Institute of Environmental Research (2005), Research on BAT and BEP of waste incinerators etc, Dioxins emission Report

Co-PCBs and HCB emissions from industrial facilities in 2001, excluding Dioxins and furan, are as follows in <Table 11>.

<Table 11> Status of Co-PCBs and HCB emission (2001 emission inventory)

Type of facility	Co-PCBs (g-WHO TEQ/yr)	HCB (g/yr)
Waste Incinerators	78.0~105.7	-
Steel	10.3	32,240.1
Non-ferrous metals	4.1	20,014.4
Nonmetallic mineral product manufacturing	0.2	829.1
Chemical manufacturing	0.0	639.3
Energy combustion industry	0.7	8,455.8
Other (Crematoria, etc)	0.3	171.1
Grand Total	**93.6 ~ 121.3**	**67,349.8**

※ Source: National Institute of Environmental Research, Dioxins emission report (2005)

As indicated in <Table 11>, waste incinerators, steel and non-ferrous metal industries showed high level of Co-PCBs emissions. Steel, non-ferrous metal industries and energy combustion industry have shown high level of HCB emissions as well.

2) Status of environmental media

(1) PCBs

PCBs monitoring in environmental media started from 1999 as a part of the "Endocrine disruptor monitoring research project" conducted by the Ministry of Environment"(1999~2005). The research showed that PCBs concentrations in water, sediment and soil were very low, complying all PCBs-related standards in ROK.

Furthermore, results of the PCBs monitoring in coastal sediments that began in 2001 showed that detection rates for PCBs were higher in living organisms than sediments. Results from the recent 2006 and 2007 monitoring showed 100% detection rate from living organisms.

<Table12> PCBs concentration in coastal sediments

Substance	Year	2001	2002	2003	2004	2005	2006	2007
PCBs	Detection rate (%)	95	96	64	64	68	68	40
	Concentration (ng/g dry wt.)	1.00~5.30 (1.48)	0.03~53.23 (4.50)	0.03~12.23 (1.31)	0.07~21.89 (3.51)	0.29~9.60 (2.20)	011~26.05 (2.50)	N.D~17.02 (1.71)

※ Figures in ( ) indicate the average
※ Source: Ministry of Land Transport and Maritime Affairs, Report on POPs contamination monitoring in the marine environment(2008)
※ Detection rate: (No. of detected Samples / Total No. of samples) × 100

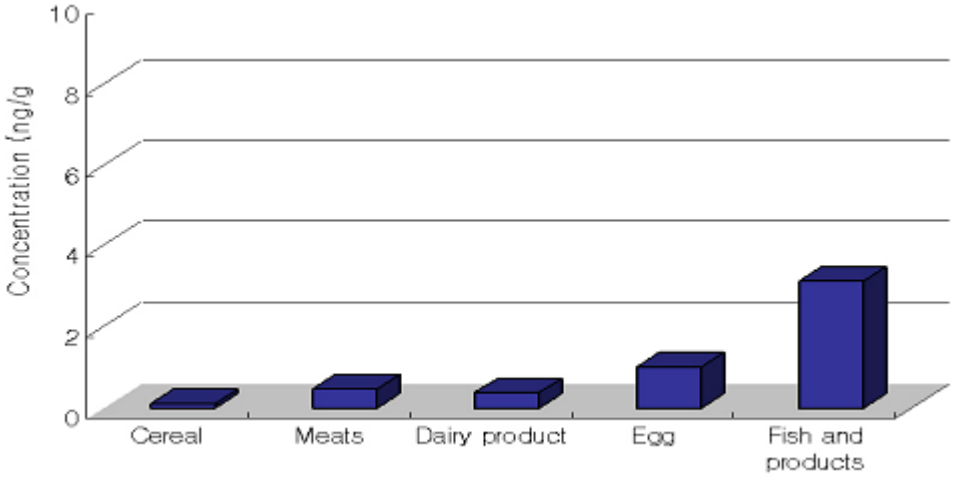
<Table 13> Dioxins and PCBs concentration in bivalvia in coastal sediments

Substance	Year	2001	2002	2003	2004	2005	2006	2007
PCBs	Detection rate(%)	70	100	100	100	100	100	100
	Concentration (ng/g dry wt.)	N.D~13.87 (2.15)	0.70~71.90 (10.47)	0.24~39.41 (6.4)	0.16~43.29 (7.77)	0.94~53.55 (7.49)	0.33~29.04 (6.92)	0.59~51.69 (9.10)

※ Detection rate : (No. of detected Samples / Total No. of samples) × 100

To identify the impact of PCBs on ecosystems, the National Institute of Environmental Research has conducted the research on the level of PCBs concentrations in fish and amphibian. PCBs have been rarely detected in them, the level of concentrations was very low, and there was no correlation between PCBs concentrations and changes in ecosystems.

Monitoring of PCBs in foodstuffs have been conducted by the Korean Food & Drug Administration since 2002 as a part of the "Monitoring project for PCBs in foodstuffs" Monitoring was performed for highly consumed foodstuffs selected on an annual basis. Results of the past 4 years showed an average of 0.12~3.15 ng/g(ppb), which were lower than the standard of 100~3,000 ng/g(ppb) set up in other countries such as USA, Japan and Germany. Considering the daily intake and weight of the Koreans, TDI (Tolerable Daily Intake) was 0.3% based on 5 μg/kg body weight/day. Therefore, it is concluded that the concentration levels are very low and is not harmful to the health of the people.



<Figure 8> PCBs concentration in foodstuffs

※ Source: Korea Food & Drug Administration research report(2004~2007)

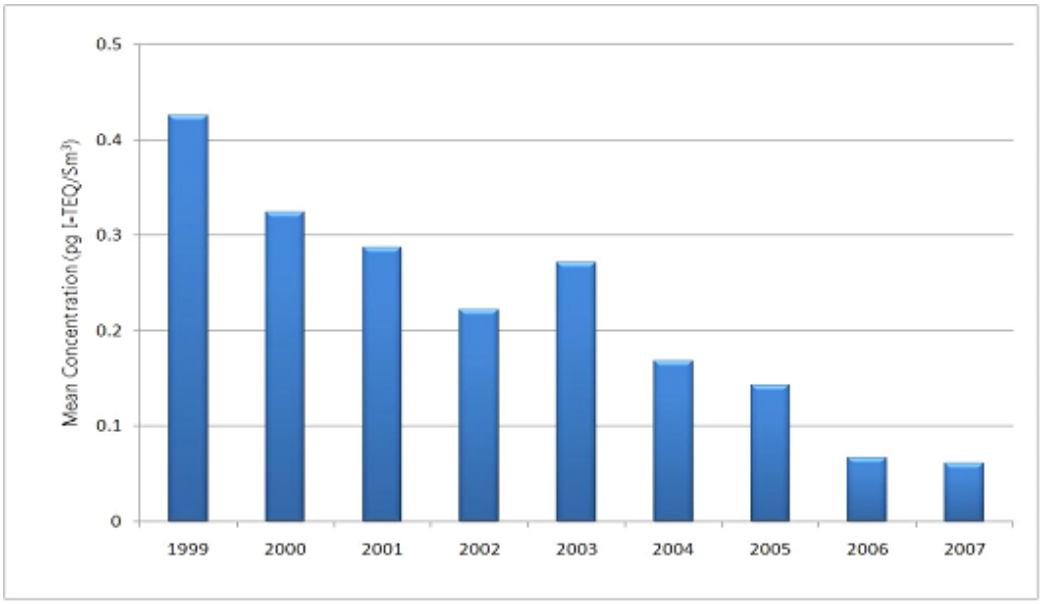
(2) Dioxins

Dioxins concentrations detected in the air have been constantly decreased since 1999. However, the Dioxins concentration levels were increased in rivers, secondary effluent, soil and bottom sediment year by year. Also, the concentrations were changed depending on the points of measurement. Until 2004, the concentrations did not change much in water and bottom sediment, but concentrations in the soil and air were fluctuated depending on the measurement point.

<Table 14> Dioxins concentration trend in various environmental media (based on I-TEQ)

Year	Water (pg-TEQ/L)	Soil (pg-TEQ/g)	Air (pg-TEQ/Sm³)	Sediment (pg-TEQ/g)
1999	0.000 ~ 0.502	0.000 ~ 22.439	0.000 ~ 4.448	0.000 ~ 0.984
2000	0.001 ~ 1.061	0.000 ~ 40.478	0.012 ~ 1.496	0.000 ~ 0.244
2001	0.000 ~ 0.946	0.000 ~ 43.333	0.013 ~ 1.664	0.000 ~ 0.537
2002	0.000 ~ 1.373	0.000 ~ 0.069	0.019 ~ 0.875	0.000 ~ 0.012
2003	0.000 ~ 0.377	0.000 ~ 0.919	0.012 ~ 1.946	0.000 ~ 0.453
2004	0.000 ~ 0.120	0.000 ~ 0.280	0.005 ~ 0.629	0.000 ~ 0.076
2005	0.042 ~ 42.977	0.005 ~ 80.934	0.004 ~ 0.539	0.000 ~ 53.624
2006	0.008 ~ 24.051	0.006 ~ 69.203	0.002 ~ 0.247	0.003 ~ 32.434
2007	0.008 ~ 38.790	0.006 ~ 4.305	0.009 ~ 0.137	0.003 ~ 36.460

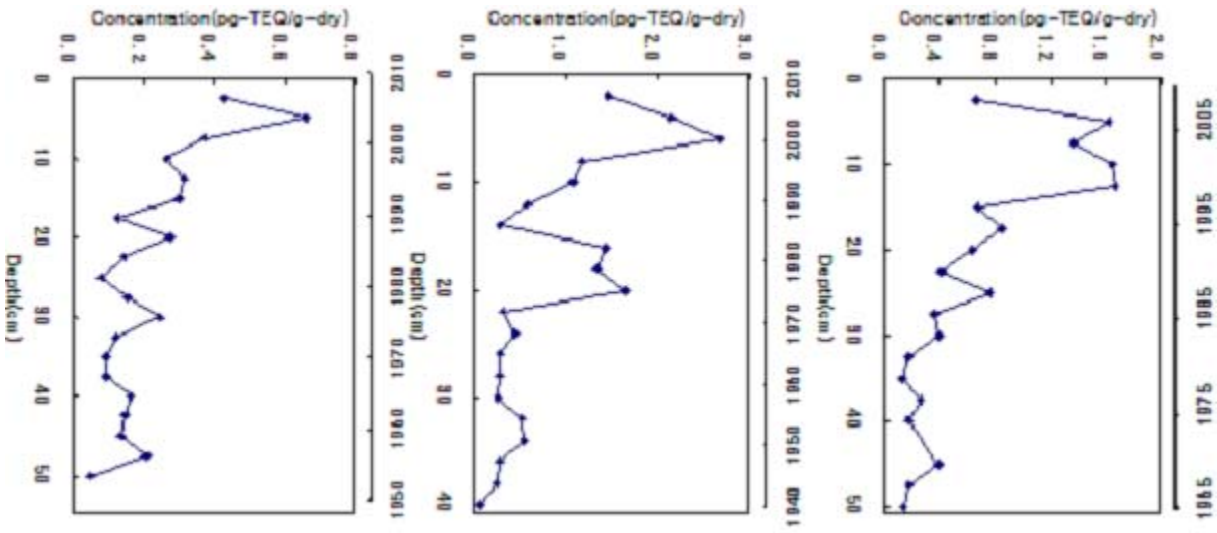
※ Source: National Institute of Environmental Research, Endocrine disruptor research report (1999~2007)



<Figure 9> Trend on Dioxins concentration in the air

※ Source : National Institute of Environmental Research, 9th Endocrine disruptor research report (2007)

According to the Dioxins concentration monitoring results on the surface and the bottom sediment of the major rivers of Korea, such as the Han River, Nakdong River and Keum River, the concentrations were very low and no significant change was observed in the concentration trend.



<Figure 10> Yearly change of Dioxins concentrations in the sediments of Nakdong River

※ Source : National Institute of Environmental Research, Monitoring on POPs concentration in river sediments (Nakdong River) (2007)

Although the detection rate in the coastal sediment and bivalvia (mussels and oysters) was close to 100%, no Dioxins was detected in the 1~2 monitoring points in 2007.

<Table 15>Trend of Dioxins and PCBs concentrations in coastal sediments

Substance	Year	2001	2002	2003	2004	2005	2006	2007
Dioxins	Detection rate (%)	100	100	100	100	92	100	88
	Concentration (Pg-TEQ/g dry wt.)	0.10~12.85 (1.86)	0.08~12.67 (2.29)	0.06~8.02 (3.32)	0.08~8.03 (1.88)	N.D~11.29 (2.10)	0.01~11.39 (2.60)	N.D~11.45 (1.80)

※ Figures in () indicate the average
※ Source: Ministry of Land Transport and Maritime Affairs, Report on POPs contamination monitoring in the marine environment(2008)
※ Detection rate : (No. of detected Samples / Total No. of samples) × 100

<Table 16>Trend of Dioxins and PCBs concentrations of bivalvia in coastal sediments

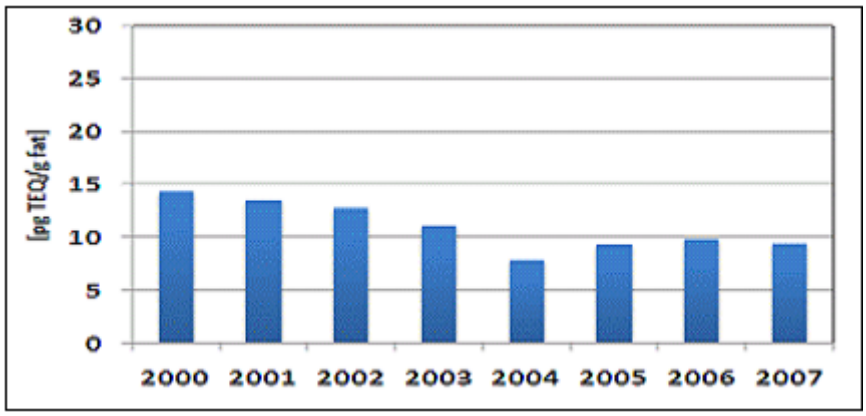
Substance	Year	2001	2002	2003	2004	2005	2006	2007
Dioxins	Detection rate (%)	100	100	100	100	100	100	96
	Concentration (Pg-TEQ/g wet wt.)	0.03~0.64 (0.2)	0.03~0.48 (0.21)	0.05~0.42 (0.17)	0.03~0.33 (0.13)	0.01~1.56 (0.19)	0.02~0.44 (0.12)	N.D~1.07 (0.13)

※ Figures in ()indicate the average
※ Source: Ministry of Land Transport and Maritime Affairs, Report on POPs contamination monitoring in the marine environment(2008)
※ Detection rate : (No. of detected Samples / Total No. of samples) × 100

The Division of Endocrine Disruptor Evaluation at the National Institute of Toxicological Research under the Korea Food & Drug Administration has been conducting monitoring and hazard valuation on Dioxins and PCBs using human samples since 1999. According to the Dioxins and PCBs monitoring in breast milk, the concentrations were very low. <Figure 11> Furthermore, the hazard level of breast milk for infants ($3.77x10^{-5}$, WHO 1998-TEF) was much lower than the maximum limit of hazard level in the background level of EPA ($1.0x10^{-3}$).

In addition, the Division of Human Exposure Evaluation at the National Institute of Toxicological Research has started a monitoring project on POPs in breast milk and blood in 2008.

Korea Food & Drug Administration will continue the monitoring of the level of POPs in foodstuffs distributed in Korea and POPs concentration in the human body.



<Figure 11> Yearly change of Dioxins in breast milk (Seoul area)

※ Source: National Institute of Toxicological Research (2007), Endocrine disruptor research report

(3) HCB

Since Hexachlorobenzene (hereinafter referred to as 'HCB')has never been introduced to ROK, it could be generated as a by-product in the process of other chemicals manufacturing (chlorobenzene, PCP, PCNB, PCE, vinyl chloride etc.) and in the operation of emission facilities. According to the monitoring data by the Ministry of Environment, ND ~ 20.37 μg/kg, ND ~ 3.79 ng/Sm^3, ND ~ 3.81 μg/kg of HCB were detected in the samples of soil, air and sediment, respectively, but the levels were negligible.

3) Control policy and status of the System

(1) Voluntary agreement

Before the enactment of the POPs Control Act, high-emission companies and the Ministry of Environment have signed a voluntary agreement in July 2005 in order to reduce the emission of POPs chemicals, such as Dioxins and furans. The agreement targeted reduction of emission by 30% of the 2001 level by 2008 and 50% of the 2001 level by 2010. In addition, continuous monitoring is carried out and results are reported to the government.

(2) Emission standard

The POPs Control Act includes the maximum release limit of Dioxins emission and number of measurements for incinerator and non-waste incinerator facilities. It also mandates facilities larger than a certain capacity to conduct monitoring on its vicinities every 3 years. The maximum limit of release for existing facilities has been strengthened progressively considering the technological and economic feasibility and more stringent standards are applied to new facilities.

<Table 17> Maximum release limit of Dioxins in waste incinerators

Category	New facilities (ng TEQ/Sm^3)	Existing facilities (ng TEQ/Sm^3)
More than 4T of hourly treatment capacity	0.1	1
Less than 4T and more than 2T hourly treatment capacity	1	5
Less than 2T and more than 25kg hourly treatment capacity	5	10

※ Note: Medical waste incinerators are excluded, 0.1ng-TEQ/Sm^3 applied for general waste incinerators with more than 2 T of hourly treatment capacity

<Table 18> Maximum release limit of Dioxins in medical waste incinerators

Application by facility Treatment capacity/hr	New facility (ng TEQ/Sm^3)	Facilities built between Jan 1 2001 and Jul 20 2004 (ng TEQ/Sm^3)	Facilities build before Jan 1 2001 (ng TEQ/Sm^3)
More than 4 T	0.1	0.1	1
Less than 4T ~ More than 2 T	1	1	5
Less than 2 T ~ More than 1 Ton	1	1	5
Less than 1 T ~ More than 200 kg	5	5	5
Less than 200 kg ~ More than 25 kg	5	10	10

※ Note: Medical waste incinerators are excluded, 0.1ng-TEQ/Sm^3 applied for general waste incinerators with more than 2 T of hourly treatment capacity

<Table 19> Maximum release limit of Dioxins in emission gas of industrial facilities

Type of facility	New facility (ng TEQ/Sm^3)	Existing facility(ng TEQ/Sm^3)		
		By Dec 13 2010	Jan 1 2011 ~ Dec 31 2014	After Jan 1 2015
Steel Sintering Furnace	0.5	1.0	0.5	0.5
Steel electric arc furnace	0.5	1.0	0.7	0.5
Aluminum manufacturing	0.5	1.0	0.5	0.5
		Jan 1 2009~ Dec 31 2011		After Jan 1 2012
Cement kiln	0.1	0.1		0.1
Copper manufacturing	1	10		1.0

<Table 20> Maximum release limit of Dioxins in wastewater

Type of facility	Maximum release limit(ng TEQ/Sm^3)		
Steel manufacturing and Aluminum manufacturing	10		
Copper manufacturing Cement manufacturing	10		
Incinerator facility	10		
Type of facility	New facility (ng TEQ/Sm^3)	Existing facility(ng TEQ/Sm^3)	
Type of facility	New facility (ng TEQ/Sm^3)	Jan 1 2009 ~ Dec 31 2012	After Jan 1 2013
Petrochemical basic composition manufacturing facility	50	300	50

<Table 21> Facilities that require vicinity monitoring of Dioxins

Facility	Steel sintering furnace	Steel electric arc furnace	Cement kiln	Rolling and pressing of copper	Industrial site waste incinerator facility
Capacity (Maximum daily production or daily capacity)	More than 5,000T/day	More than 3,000T/day	More than 12,000T/ day	More than 50T/day	More than 50T/day

Dust, waste absorbers, sludge, waste acid, waste alkali are categorized as dioxin-containing waste in the POPs Control Act and the quantity applied for management is as follows in <Table 18>.

<Table 22> Type and quantity standards for dioxin-containing waste

Waste	Type	Quantity
Dioxin-containing waste	Dust, waste catalyst, sludge, waste absorbers, waste acid, waste alkali	Liquid: more than 100pg-TEQ/L Solid: more than 3ng-TEQ/g

Chapter 4. National Implementation Plan

The Convention stipulates the obligations of each member country in Articles 3 through 16. The National Implementation Plan for ROK for these Articles except for Article 7, which refers to the submission of the plan, is as follows.

1. Article 3: Elimination of intentional POPs

ROK has a goal to eliminate intentional POPs. The 9 types of POPs agricultural chemicals including DDT have been prohibited from manufacturing, distribution and usage through legal frameworks 30~40 years ago. Furthermore, chemicals to be designated as POPs chemicals in the future will also be prohibited from manufacturing, usage and distribution just as the existing POPs agricultural chemicals.

The Control of POPs agricultural chemicals in ROK is compliant with all obligations stipulated in the Convention and the detection rate of POPs chemicals in the environment is minimal. However, as some chemicals are still detected, the "POPs monitoring project" has started in 2008 for the continuous surveillance of POPs agricultural chemicals.

In addition, the Ministry of Land Transport and Maritime Affairs has a plan to establish a monitoring network only for POPs independent upon the maritime environment monitoring network, to measure the level of POPs contamination in the sea water, submarine sediment and marine life (mussel, oyster). It will be used for the verification of the compliance with the maritime environment standards as prescribed in the Marine Environment Control Act. The POPs monitoring network consisting of 25 points of measurement in the coastal offshore area will go into operation in 2008 and the number of measurement points will be added each year.

The implementation plan for the Control of intentional POPs, particularly agricultural chemicals, will be carried out in short-and mid-term implementation manner for the two categories as stated in Table 23.

<Table 23> Implementation plan for POPs-containing agricultural chemicals

Category	Short-term implementation plan (2008 ~ 2011)	Mid-term implementation plan (2011 ~ 2028)
Monitoring and investigation of POPs agricultural chemicals contamination status	ㆍInvestigation POPs contamination in environmental media as a part of the monitoring network	-
Remediation of the POPs agricultural chemicals contaminated area	ㆍIdentification of level of contamination in presumed contaminated area - Soil and crops etc.	ㆍRemediation of contaminated area ㆍMinimization of impact on the ecosystem ㆍRegulation on contaminated food ㆍPreparation of an alternative through Epidemiological testing on contamination on the human body

2. Article 4: Specific exemption

No POPs are considered to be the specific exemption of the Convention in ROK. Furthermore, we have no plans to apply for specific exemption for any existing POPs chemicals in the future. However, the possibility of application for specific exemption on newly added POPs chemicals exists.

3. Article 5: Reduction of unintentional POPs

The principle of unintentional POPs Control in ROK lies in the reduction of emission through the management of the emission sources. The maximum release limit and facility standards for the high-emission sources of unintentional POPs are controlled by the law. The law has been applied to waste incinerators since 2001 and to industrial facilities since 2008.

The goal for the control of unintentional POPs is the reduction of unintentional POPs emission and reduction of persistence in the environment. The reduction of emission and the maximum release limit have been set up based on the characteristics of each source of emission. Unintentional POPs emissions are estimated each year by the monitoring of the POPs concentrations in air, soil, sediment, rivers and lakes.

1) Management control of emission source

The reduction of Dioxins emission is implemented by applying the maximum release limit for large waste incinerators to that for small ones.

In addition, as the criteria for the maximum release limit become more stringent for industrial facilities, efforts will be made to change the process conditions, and install prevention units in the facility. Thus, the Dioxins emission from industrial facilities as well as non-waste incinerator facilities will be reduced.

A management plan will be prepared for the effective management, let say, by making a Dioxins emission inventory every 2 years. Such efforts on reducing Dioxins are expected to decrease the emission of dioxin.

The high-emission facilities for Dioxins are as follows.

① Waste Incinerators

The emission quantity analysis from the waste incinerators shows that Dioxins emission in 2006 was decreased to 53.7% of the total emission from the facility compared to 87.4% in 2001. According to the emission inventory of 2001, small-size incinerators accounted for approximately 50% of the total Dioxins emission.

Currently, incinerators with capacity of over 25kg/hr are controlled. The government is encouraging small waste incinerators to expand their capacities under the “National Comprehensive Waste Control Plan”, which is designed to reduce Dioxins emission from decrepit waste incinerators.

Most of the items stipulated in the Stockholm Convention are stipulated in the Korean law as a part of the Best Environmental Practice (BEP).

In the Best Available Technology (BAT) of general waste incinerators which have a capacity of more than 2 ton/hr, most are consisted of semi-dry absorbers (SDA), activated carbon (A/C) back filter. Some of the facilities have Selective Catalytic Reduction (SCR). The concentration level of Dioxins is 50% of the most stringent maximum release limit of 0.1ng-TEQ/Sm^3.

Facilities with capacity of between more than 25 kg/hr to less than 2 ton/hr mostly consist of semi-dry absorber (SDA), activated carbon (A/C) back filter and the Dioxins level decreased to limits. However, general waste incinerators are only equipped with units for the elimination of coarse dusts. Therefore, it is

difficult to keep the maximum release limit for Dioxins emission. It is expected that such facilities would progressively close down due to the economic reasons.

The Dioxins emission level from the incinerators in industrial sites varied greatly based on the characteristics of wastes. Therefore, it would be more reasonable to recommend the compliance of BAT standards based on the characteristics of the wastes produced at the sites rather than mandate the compliance of BAT standards.

The waste incinerators are obligated to measure and report the level of Dioxins at least once every two years based on incineration capacity. The details on the report are available.

② Steel sintering furnace

According to the Dioxins emission inventory of 2001 and 2006, the portion of Dioxins emission from steel sintering furnace decreased from 57.4% to 21.6% and the average Dioxins emission concentration also decreased from 0.880ng-TEQ/Sm^3 to 0.195ng-TEQ/Sm^3, showing lower than the maximum release limit (1.0ng-TEQ/Sm^3). The quantity of Dioxins emission is expected to decrease when the maximum release limit is applied to the existing facilities.

Some facilities are voluntarily making efforts on applying BAT/BEP (activated carbon tower etc.) to reduce emission. However, in 2010, when new facilities are opened and start operations, the amount of Dioxins emission is expected to slightly increase.

③ Steel Electric Arc Furnace

According to the Dioxins emission inventory of 2001 and 2006, the fraction of Dioxins emission from steel electric furnace increased from 16.6% to 36.2% and the average Dioxins emission concentration increased from 0.084ng-TEQ/Sm^3 to 0.221ng-TEQ/Sm^3, but it still remains lower than the maximum release limit (1.0ng-TEQ/Sm^3). However, after guidelines for each company will beset up at the 30% level of the maximum release limit, a decrease in emission is expected.

④ Aluminum manufacturing facility

According to the Dioxins emission inventory of 2001 and 2006, the portion of Dioxins emission from aluminum manufacturing facility slightly increased from

1.8% to 4.3% and the average Dioxins emission concentration decreased from 0.374ng-TEQ/Sm³ to 0.185ng-TEQ/Sm³, and it remains lower than the maximum release limit (1.0ng-TEQ/Sm³). Companies that showed higher level of concentration in emission have replaced pollution control unit for the reduction of Dioxins emission. Also, the application of maximum limit is expected to reduce the quantity of emission.

⑤ Copper manufacturing facility

According to the Dioxins emission inventory of 2001 and 2006, the portion of Dioxins emission from copper manufacturing facility slightly increased from 9.6% to 11.7%. The variation in the Dioxins emission concentration was high. After excluding the 3 cases in 2001 and the 3 cases of the detected values are larger than 10ng-TEQ/Sm³ in 2006 that exceeded the maximum value, the average Dioxins emission concentration increased from 0.138ng-TEQ/Sm³ to 0.808ng-TEQ/Sm³, but most remains lower than the maximum release limit (1.0ng-TEQ/Sm³).' When the maximum limit under the POPs Control Act is applied, it is expected that the quantity of Dioxins emission will greatly decrease.

⑥ Cement kiln

According to the Dioxins emission inventory of 2001 and 2006, the fraction of Dioxins emission from cement kilns slightly increased from 1.7% to 6.2% and the average Dioxins emission concentration decreased from 0.055ng-TEQ/Sm³ to 0.041ng-TEQ/Sm³, and it remains lower than the maximum release limit (1.0ng-TEQ/Sm³). When the maximum limit is applied to cement kilns, it is expected that the quantity of Dioxins emission will decrease.

⑦ Other facilities

Crematoria where the entity of management is unclear will be included as an emission facility and maximum limit for Dioxins emission will be applied and more stringent measures will be used to manage such facilities. Some Crematoria have voluntarily installed BAT/BEP for the emission reduction of dioxin. Therefore, it is expected that emission of Dioxins at Crematoria will decrease.

⑧ Emission reduction goals

As described above, ROK has a legal system for the reduction of unintentional POPs as prescribed in the Convention. In order to meet the maximum release limit, the applications of the Best Available Technology (BAT) and the Best Environmental Practice (BEP) are required.

The concentration of emission should be reported for each period of measurement in order to confirm the compliance of the maximum release limit. When the standards are enforced and efficiently operated, the ROK government will prepare a detailed implementation plan with unintentional POPs emission reduction goals.

2) Environmental monitoring

Facilities with emissions that exceed a certain quantity should conduct vicinity Dioxins monitoring every 3 years to identify the level of contamination.

POPs monitoring network will be operated under the POPs Control Act and the Marine Environment Control Act in order to analyze the relevance between the emission facility and the vicinities. The number of measurement points will be increased in order to accumulate accurate data.

4. Article 6: Elimination of machinery and devices containing POPs

The basic principle on the control of POPs-containing wastes in ROK is to minimize the impact of POPs on the environment. The control goal for POPs-containing wastes and devices that have already been generated or will be generated in the future is to adequately treat them. For the rest of the wastes, the goal is to minimize discharge after safe treatment.

POPs-containing wastes can be categorized into PCBs-containing waste, dioxin-containing waste and waste agricultural chemicals and no POPs-containing devices. At this time, no PCBs-containing machinery is currently used in ROK.

1) National Implementation Plan on POPs excluding PCBs

In the past 20 years, no report has been published on the generation of POPs-containing agricultural chemical wastes. Collection, transportation and treatment of agricultural chemical wastes are strictly managed under Article 17 of the Waste Control Act. This allows safe treatment of POPs-containing agricultural chemicals through the surveillance system.

No statistical data have been available for dioxin-containing waste, but it is managed as a designated waste under the Waste Control Act. Through an investigation on the complete process from the generation to treatment of dioxin-containing waste, the Dioxins emission route will be identified for the ultimate elimination.

2) National Implementation Plan on control of PCBs waste and devices

The implementation plan for the Control of PCBs-containing wastes and devices is a 5-phase plan as shown in Table 24. The 1st phase plan is focused on the establishment of the management system and improvement of the management capability of PCBs. The 2nd phase plan is concentrated on the control of the hazard of PCBs and the adequate treatment.

<Table 24> Implementation plan for POPs-containing waste

Category	Ministry	1st phase implementation plan (2008 ~ 2011)	2nd phase implementation plan (2012 ~ 2028)
Identification of emission sources	Ministry of Environment	ㆍIdentification of PCBs contamination in transformers ㆍIdentification of PCBs contamination on devices other than transformers	
Identification of status of contamination Remediation of contaminated area	Ministry of Environment	ㆍSurvey on environmental media based on POPs monitoring network	ㆍSurvey on environment media based on POPs monitoring network ㆍRemediation of contaminated areas
Identification of status of contamination Remediation of contaminated area	Ministry for Food, Agriculture, Forestry and Fisheries	ㆍMonitoring on contamination of farming areas ㆍResearch on reduction of exposure and harm for farm workers ㆍMonitoring on livestock and feed	

Category	Ministry	1st phase implementation plan (2008 ~ 2011)	2nd phase implementation plan (2012 ~ 2028)
Identification of status of contamination Remediation of contaminated area	Ministry of Land Transport and Maritime Affairs	ㆍMonitoring on Contamination on marine ecosystem ㆍResearch on Persistence in fisheries ㆍResearch on biological impact	
Identification of status of contamination Remediation of contaminated area	Ministry for Health, Welfare and Family Affairs	ㆍMonitoring on foodstuffs etc. ㆍMonitoring on POPs contamination trend in human samples ㆍEvaluation harm on the human body	
Establishment of relevant law and regulations	Ministry of Environment	ㆍIncreased role of PCBs policy council	
Environmentally-friendly treatment	Ministry of Environment	ㆍForecast of quantity of CBs-contaminated wastes ㆍEstablishment of foundation for treatment of PCBs -contaminated waste	ㆍTreatment of PCBs and PCBs-contaminated waste
National and international information exchange	Ministry of Environment	ㆍDevelop and execute education and promotion activities ㆍDevelop international cooperation programs	ㆍDisclose information and perform international cooperation projects

① Survey on emission sources of PCBs-contaminated wastes and devices

The inventory prepared from the survey will be divided into two categories; PCBs contamination in transformers and PCBs contamination in devices other than transformers. Basic investigation has been conducted so far, but the status of PCBs-contaminated devices and wastes must be identified through more statistically meaningful sample testing methods. In order to eliminate PCBs-contaminated wastes and devices, a list on PCBs-containing devices must be prepared as soon as possible. Therefore, a plan to prepare such lists has been set for 2008 and 2009.

② Survey and investigation on PCBs-contamination and remediation of contaminated areas

The Ministry of Environment has been conducting monitoring on the environmental media through the "POPs monitoring network" from 2008. Also, the Ministry for Food, Agriculture, Forestry and Fisheries plans to monitor and investigate the status of contamination in farmlands, farm workers, livestock, meat, feed and livestock farms. The Ministry of Land, Transport and Maritime Affairs plans to conduct “Monitoring project for marine ecosystem”, “Research on persistence in fisheries” and “Research on impact on organisms” to identify the status of contamination. At the Korea Food &Drug Administration under the Ministry for Health, Welfare and Family Affairs plans to identify the status of contamination through the projects such as “Research on monitoring endocrine disruptors in foodstuffs”, "Research project on the impact of hazardous material on the human body" and “Project for the hazard assessment for the human body”. After each ministry's investigation by 2011, the identified contaminated areas will go into remediation from 2012 through the collaboration with the Ministry of Environment and other relevant Ministries.

③ Creation of PCBs-related laws and regulations

The role of the PCBs Policy Council will be strengthened in order to conduct the monitoring and investigations based on the roadmap for PCBs elimination. The council will review and complement the projects during the process of implementation.

④ Environmentally-friendly treatment of PCBs-contaminated wastes and devices

Through the PCBs research projects by the Ministry of the Environment, the public sector is not only supporting but also involved in the technology development for the treatment of PCBs containing wastes.

The 1st phase (2008~2001) for the environmentally-friendly treatment of PCBs-contaminated wastes will be on laying the foundation. Article 22 of the POPs Control Act suggests high-temperature incineration, high-temperature melting, chemical treatment and cleansing as safe and viable methods for the treatment of PCBs-containing wastes. The treatment technology will be developed in the 1st phase and the actual treatment will take place in the 2nd phase (2012~2028).

⑤ National and international information exchange

The national and international information exchange will take place in 1st and 2nd phases. The first phase will cover education and promotion on safe control of PCBs through the development of education and promotion program and international cooperation program. The second phase will cover implementation of international cooperation projects based on the developed program.

5. Article 8: Reinforcement and control of Annexes A, B and C

The control of chemical substances is governed by 7 ministries under 13 Acts based on the type and usage of the chemicals. However, POPs chemicals are managed under the POPs Control Act, which was enacted in 2008 and new substances added to the Convention will also be managed under the POPs Control Act.

All reviews on new chemical substances in the Convention are conducted at the POPRC (Persistent Organic Pollutant Review Committee). After the POPRC review, registration of the new chemical substance is determined at the General Council.

Examinations on hazard of chemical substances are performed under the Hazardous Chemical Substance Control Act. Based on the evaluation, the chemicals are designated as toxic substance, substance for watch, prohibited substance or banned substance. Furthermore, the chemicals listed in the Convention are designated as banned substance in the Hazardous Chemical Substance Control Act regardless of the type of substance. The POPs Control Act prescribes that substances that are listed in the Annex of the Convention automatically becomes a substance that require control in the same level as existing POPs substances. Therefore, new substances that are designated as POPs substances will be stringently controlled in ROK in the same level as the existing substances in the Convention.

Continuous investigation on the characteristics, domestic use and control status and existence of substitute material will be performed for substances that require control due to the high level of toxicity and risk profile. In addition, review of the substances for additional listing in the Convention will be carried out as an effort to actively participate in listing activities in the Annexes.

6. Article 9: Information exchange

The Convention requires the actions for the countries concerned to facilitate the exchange of information on the prohibition of manufacturing and use of POPs and their risk profiles.

In ROK, results on all POPs monitoring projects results and the emission quantity information are open to public via on the internet. In addition, we also provide the venue for the exchange of information on all POPs-related regulations and monitoring results in the East Asian region through the POPs information warehouse project.

Furthermore, ROK is committed to provide all POPs-related information to the secretariat and countries provided that it is not commercial information protected by the Korean law or confidential information.

7. Article 10: Awareness enhancement and education on POPs

The Convention requires that all signatories provide intensive information on POPs control policies and their hazard to the society through information provision and education to all parts of the society.

ROK is making its utmost effort on disseminating information on POPs through R&D cooperation with the government and academia. Also, the government provides support for academic activities such as the POPs forum organized by the private sector and discloses information via the internet to meet the Korean people’s right to know. Press releases are disseminated to promote POPs-related activities and such efforts will become further strengthened.

8. Article 11: Research, development and monitoring

1) POPs monitoring network project

A legal framework was listed in Article 11 of the POPs Control Act to set up and operate POPs monitoring network in order to identify the level of contamination in the air, water, soil, river sediment and organisms and the impact on neighboring countries due to its characteristics of long distance mobility.

Based on such framework, the Ministry of Environment has finalized the operation plan for the POPs monitoring network in the air, water, sediment and soil in 2007 and 2008. The monitoring program will be continuously implemented.

The projects are currently carried out for 12 types of POPs. Newly listed substances will be added to the projects.

In addition, the Ministry of Land Transport and Maritime Affairs is in charge of the POPs monitoring research on the marine ecosystem pursuant to Article 39 (Survey on POPs substances) of the Marine Environment Control Act. The points of monitoring were selected after excluding the areas near the emission source in order to conduct a representative investigation. The points of monitoring will be further added and efforts will be made to improve the accuracy of the evaluation. Also, efforts will be made to reduce the deviations in the regional representative points.

9. Article 12: Technical assistance

Article 12 of the Convention states that the signatories become aware of the fact that providing technical assistance to the developing countries and the economies in transition with the adequate technical assistance in a timely manner is essential for the successful implementation of the Convention.

ROK has embarked on a POPs information warehouse project in 2005 in order to share information in the East Asian region. The ROK government is encouraging countries to participate and suggested that it would provide the sources for relevant programs free of charge.

The ROK government plans to provide continuous support to the neighboring developing countries and economies in transition to eliminate POPs and comply with the Convention, as the budget is allowed.

10. Article 13, 14: Financial mechanism

The budget for the Stockholm Convention mainly relies on the contributions from each country and the GEF (Global Environment Facility). ROK is one of the 32 donor countries that have made a contribution to the 4th fund in 2006. ROK plans to support the fund-raising effort that takes place every 4 years, as long as the budget is available for this purpose. Furthermore, ROK has a plan to fulfill its obligation to make annual contributions according to the schedule as stated in the contribution agreement.

11. Article 15: Report

As ROK has obtained a signatory status in April 2007, the 1st report was not submitted by December 2006. However, ROK plans to follow the obligations as stated in the Convention. Thus ROK will submit a written report in the designated form within the set period.

12. Article 16: Effectiveness evaluation

The Convention prescribes that the 1st Effectiveness Evaluation is completed in the COP4 in 2009 as decided in the COP2 held in 2006 and thus the GMP has been approved at the COP3.

The ROK government plans to make continued contributions to the GMP by both operating the POPs monitoring network from 2008 and continuously implementing the "East Asia POPS monitoring warehouse project" that began in 2005 in order to provide a venue to exchange POPs-related information with the neighboring countries.

Chapter 5. Review and Revision of the Status of National Implementation Plan

The government agencies with the related ministries of ROK will review the status of implementation of the POPS Control Act along with preparation for the POPs Management Council.

In addition, ROK plans to submit a revised version of this National Implementation Plan after consulting with the central government agencies in order to reflect the listings of new substances in the Convention, changes in national plan with other possible variations in the environment, society or the economy.