

**Appendix 1: Primary assessment report on pesticidal POPs in China**

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PRIMARY ASSESSMENT REPORT ON  
PESTICIDAL POPs IN CHINA**

Unedited draft English text of final report in Chinese

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## 1. Introduction

Among the 12 Persistent Organic Pollutants (POPs) under the control of the Stockholm Convention, there are 9 organic chlorine pesticides. Therefore eliminating, phaseout and controlling of pesticidal POPs it is one of the predominant facets in performing POPs Convention. China used to produce and use organic chlorine pesticides in a large quantity, such as DDT. Most pesticidal POPs have been forbidden decades ago. However, DDT, chlordane, mirex and hexachlorobenzene (HCB) are still produced in China for limited usages. Since China is one of the main countries that produce and consume pesticides, it will be the predominant content in formulation Chinese NIP of implementation POPs Convention that the basic status of pesticidal POPs are surveyed, analyzed and assessed totally.

According to the requirement of Term of reference of the GEF/PDF-B “the NIP pro-items formulation of Implementation Stockholm Convention of China——initial assessment and identify the NIP working demands”, this report analyzes and assesses the basic status of pesticidal POPs of China, based on the present data, information and the initial survey, and gives some advices on further NIP formulation.

One Sino-Italy project, which is focusing on Strategies for reduction and phaseout pesticidal POPs, was started in early 2002; and it will be completed by the second half of 2003. The outputs of the Sino-Italy project are used for this PDF-B project. The designed NIP activities presented in this document are also including contribution of Sino-Italy project as part of the entire activities; and the incremental cost is separated in two categories to avoid double accounting.

## 2. Pollutant Sources of Pesticidal POPs in China

### 2.1 Production, Usage, Import and Export

Currently organic phosphorus pesticides are the dominant ones in China, accounting for about 77%<sup>1</sup> of total pesticides. However, organic chlorine pesticides had been the leading ones among during 1950s to 1970s, of which DDT was representative. Among the 9 pesticidal POPs in the Convention, 6 pesticidal POPs (DDT, toxaphene, HCB, chlordane, heptachlor and mirex) were produced in industrial scale, and 3 pesticidal POPs (aldrin, dieldrin and endrin) were produced at pile plant level, or in research phase in the period<sup>2</sup>. China has introduced Pesticides Register System since 1982, and now only DDT is in production and limited use as stock for dicofo and as disease vector for anti-malaria. HCB has not been used as pesticide in China, but is used as stock for producing pentachlorophenate (PCP). Basically,

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<sup>1</sup> Department of Pollution Control of National Environmental Protection Board, China. The Rotterdam Convention on Introducing Pre-awareness and Agreement Proceeding of Some Dangerous Chemical and Pesticide in International Trade. Aug. 1999.

<sup>2</sup> Association of Petroleum and Chemical Industry, China. Feb. 2002.

chlordane and mirex were banned as pesticides in China, but they are still produced and used for preventing termite due to limited alternatives. The production and development of toxaphene, heptachlor, aldrin, dieldrin and endin has been forbidden. Therefore we can draw an initial conclusion that the pesticidal POPs, which are still in production and use, are DDT, chlordane and mirex. In addition, HCB is treated as pesticidal POPs because it is used as the intermediate of sodium pentachlorophenate (to prevent schistosomiasis).

### 2.1.1 Production, Usage, Import and Export of DDT in China

#### PRODUCTION

DDT had been produced since 1950s in China, and between middle of 1960s and 1980s its production was enormous, adding up to more than 430 thousands tons<sup>3</sup>. There had been 11 DDT enterprises in China, and there are only two now, Tianjin Chemical Plant and Yangzhou Pesticidal Plant, because the production and use of DDT are limited after introducing the Pesticide Register System in early of 1980s. The DDT produced by Yangzhou Pesticidal Plant can only be used as the intermediate of dicofo, and can not be sold as production. Now, the total production capacity of these two plants is 9 thousand tons per year. The total production quantity is 4-6 thousand tons per year (Tianjin has about 2.5-3.5 thousand tons, and Yangzhou has 1.5-2.5 thousand tons)<sup>4</sup>. However, there were once many DDT formulation producers in China. There are three DDT formulation producers which are producing DDT formulation already identified by the Sino-Italy project survey team.

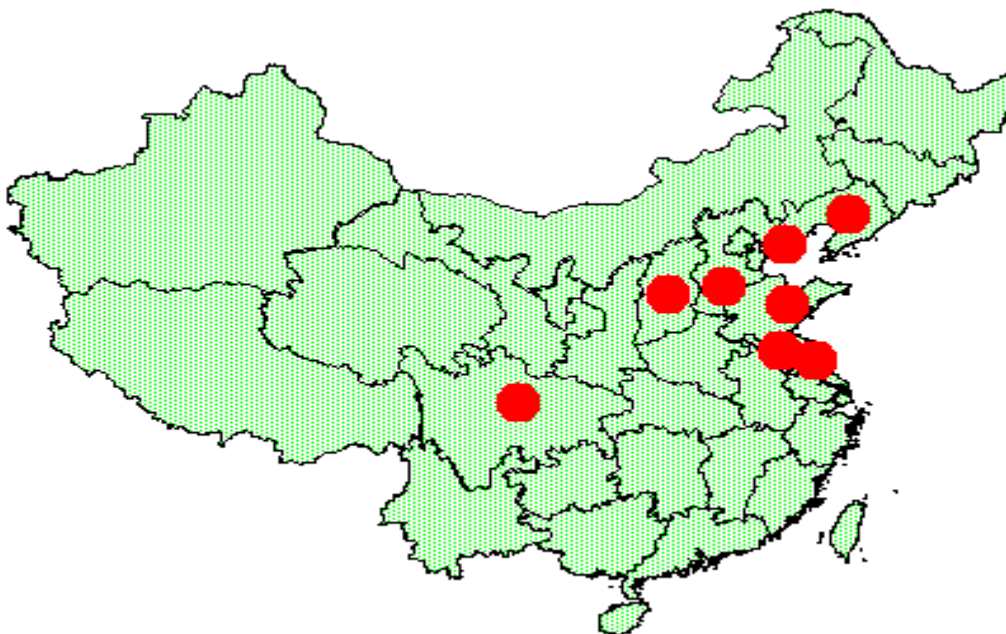


Fig 1 The Distribution of DDT Producers

#### USAGE

<sup>3</sup> Referential survey of "Chinese and Italian Pesticidal POPs Project". Oct. 2002

<sup>4</sup> Survey on the spot: Tianjin Chemical Plant and Yangzhou Pesticidal Plant. May 2002

DDT has been prohibited from employ in agriculture since 1983 in China<sup>1</sup>, and it is used for three purposes: 1) Stock of dicofo; 2) Disease vector; 3) Export. Besides, some of them are used to producing for mosquito-repellent incense and special paint<sup>2</sup>, but that needs further investigation. In China, DDT is used as disease vector that infect malaria in southern provinces, especially when flood breaks. There are two DDT plants in China now, and Tianjin Chemical Plant is the only one who was authorized to deal in the three purposes above. The DDT produced by Yangzhou Pesticidal Plant can only be used as the stock of dicofo, and if the DDT produced by Yangzhou could not fulfill the need, Yangzhou may purchase some from Tianjin. The accumulated DDT production is about 430 thousands tonnes in China. From 1995 to 2000, the total production amount is about 2-3 thousand tons per year<sup>3</sup>, and the annual consuming quantity is estimated 3-4.5 thousand tons<sup>4</sup>. The history of DDT production is shown in below. The consuming amount for each purposes of DDT needs further investigation.

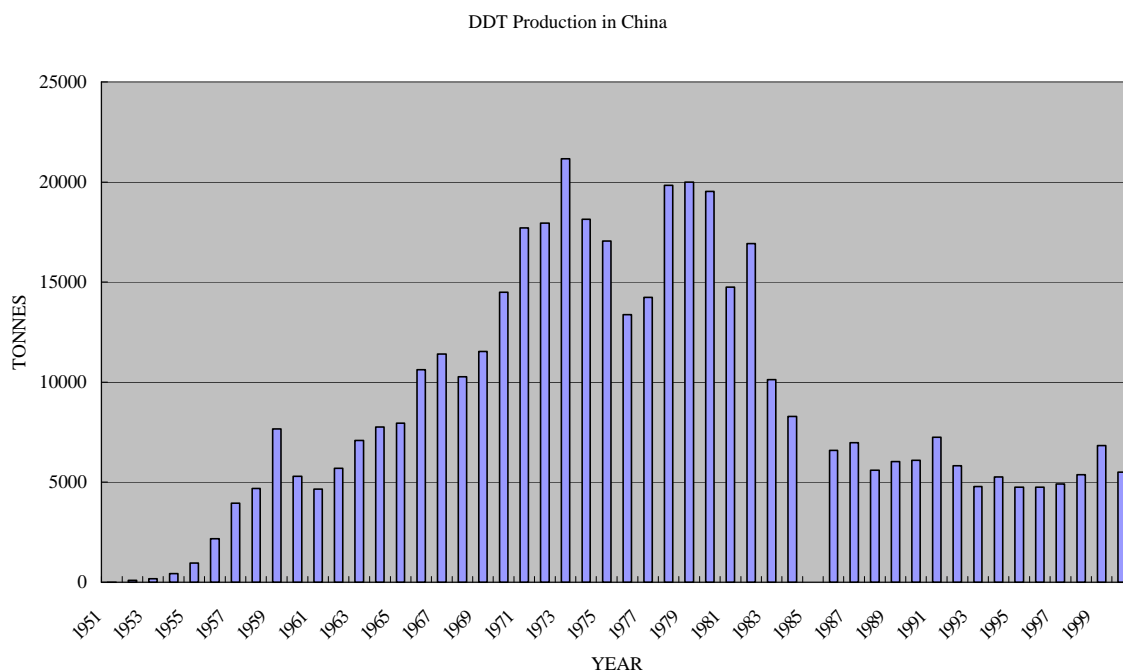


Fig 2 The history DDT Production in China

### IMPORT and EXPORT

China had imported DDT in 1950s because of production capacity insufficiency, and the Custom's statistics showed that about 20t DDT was imported in 1991<sup>5</sup>. But, China has sufficient or even superabundant DDT production capacity current, and DDT was listed in *Managing Regulation of Imported Chemicals for the First Time and*

<sup>1</sup> Consulting several experts

<sup>2</sup> Pesticidal POPs Project of China and Italy

<sup>3</sup> Department of Pollution Control of National Environmental Protection Board, China. The Rotterdam Convention on Introducing Pre-awareness and Agreement Proceeding of Some Dangerous Chemical and Pesticide in International Trade. Aug. 1999

<sup>4</sup> According to the production ratio of Yangzhou Pesticidal Plant. DDT : dicofo ~ 1.5 : 1

<sup>5</sup> General Custom Bureau of China. Annual Bulletin of Imports and Exports. 1981-1996

*Imports and Exports of Toxic Chemicals* in 1994, therefore there is little possibility that China import DDT. The DDT import data in the past few years have not been confirmed.

Export is one of the main purposes that China produce DDT. DDT is exported to the tropical regions where malaria breaks out heavily such as Southeast Asia and Africa, used for disease vector. The exports fluctuates following with marketing, for examples, the exports of DDT was 250t (including some HCB) in 1995<sup>6</sup>, and 350t (including some HCB) in 2002<sup>7</sup>. DDT and HCB are ranked into one category in the Custom's statistics, and it is only their sum exports can be known. Therefore the exports of DDT needs further survey and analysis.

### **2.1.2 Production, Usage, Import and Export of HCB in China**

#### PRODUCTION

It is recorded in some archives that there had been 6 HCB enterprises in China, but most have stopped their production today. There is only one in production now; and another HCB plant has stopped its production but with existing producing equipments. Because HCB is used as chemical stock mainly, there is no detailed statistic of HCB production. It is estimated that the annual production quantity is thousands of tons<sup>1</sup>.

#### USAGE

HCB has not used as pesticide in China (HCB can be uses as soil fumigant). In China, HCB is mainly used as the chemical mediate of pentachlorophenol and sodium pentachlorophenate, chemical dissolvent and other chemical assistant. The usages in different purposes of HCB need thorough survey.

#### IMPORT and EXPORT

The import of HCB has not been proved. Since China has the sufficient production capacity, there may be little possibility that China import HCB. But further investigation is demanded. DDT and HCB are ranked into one category in the Custom's statistics, and it is only their sum exports can be known. Therefore the exports of HCB need further survey and analysis.

### **2.1.3 Production, Usage, Import and Export of Chlordane and Mirex in China**

Chlordane and mirex are termite preventing medicaments with excellent and persistent potency. Termite spreads in 2/3 provinces of total in China, and does severe harm to China. In the areas to the south of the Changjiang River, termite endangers the buildings more serious from the north to the south, and the buildings destroyed by termite account for 30-90%. Moreover, termite also damages levees, crops, forests and underground communication facilities. The annual economic loss resulting from the

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<sup>6</sup> Association of Petroleum and Chemical Industry, China. Feb. 2002

<sup>7</sup> Same to 3

<sup>1</sup> Consulting Professor Zhengyu Lee

damage of buildings by termite is up to 15 hundred million in China<sup>2</sup>.

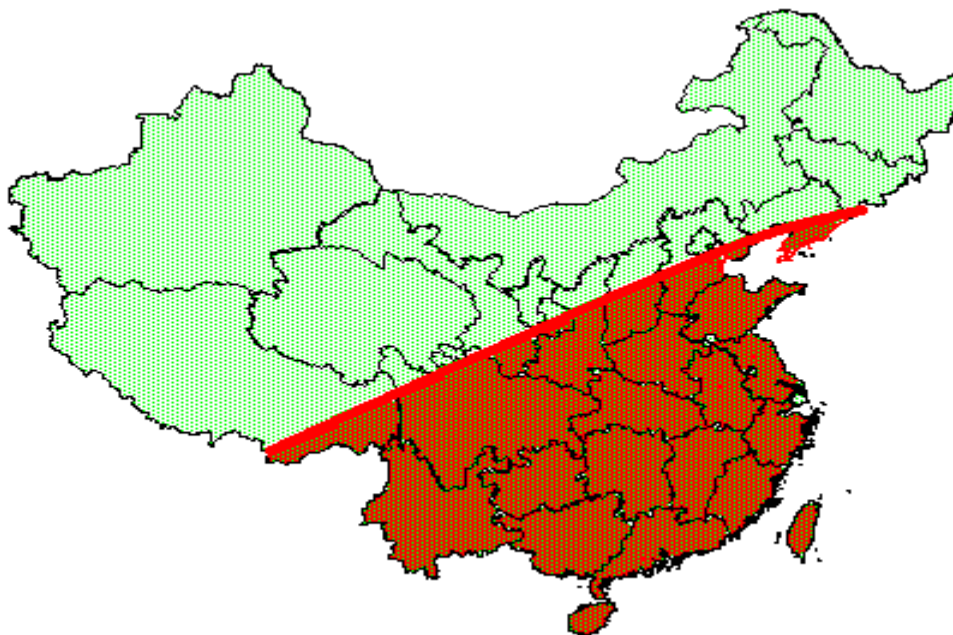


Fig 3 Termite Impact in China (the area below the red line)

### PRODUCTION

It is recorded that there are 13 chlordane plants and 8 mirex plants in China, but most of them have stopped their production, since State Economic & Trade Commission forbade chlordane production in 1999. However, restricted by current technological, economic conditions and regulations, chlordane and mirex cannot be replaced in China by suitable alternatives, and both of chlordane and mirex are still in production. Some statistical data show that the production quantity of chlordane was 160t in 1998 in China<sup>3</sup>, and the production of mirex is unknown. Because the production has not been registered, both the amount of chlordane and mirex plants and the exact production quantity demand further survey.

### USAGE

Chlordane and mirex are used for termite prevention in buildings, levees and other construction. The usage of chlordane was 130t per year<sup>1</sup>. But another statistic shows that the annual usage of chlordane for buildings is more than 200t, and that of mirex is about 300kg, excluding the usage for agricultures, forests and water conservancies<sup>2</sup>. The usage data need further survey in detail.

### IMPORT and EXPORT

<sup>2</sup> Chuanguo Xia, Zirong Dai. The Termitic Damage and the Usage of Termitic Insecticide in China. Agricultural Science and Management (Supplement). 2001

<sup>3</sup> Department of Pollution Control of National Environmental Protection Board, China. The Rotterdam Convention on Introducing Pre-awareness and Agreement Proceeding of Some Dangerous Chemical and Pesticide in International Trade. Aug. 1999

<sup>1</sup> Association of Petroleum and Chemical Industry of China. Feb. 2002

<sup>2</sup> Jia'an Cheng. The Status and Strategies of Termite Prevention in China. Memoirs of Seminar on Persistent Organic Pollutants (POPs). Mar. 2001



The annual exports of chlordane is 30t, and that of mirex is unknown<sup>3</sup>.

#### 2.1.4 Status of Other Pesticidal POPs in China

##### TOXAPHENE and HEPTACHLOR

Toxaphene and heptachlor had been produced in industrial scale before the middle of 1980s in China. There had been 16 toxaphene plants, and the total production quantity was up to 3 thousand tons in 1970s<sup>4</sup>. There had been 8 heptachlor plants, and the total production quantity was about 1 ton in 1969<sup>5</sup>. Toxaphene is a kind of broad-spectrum organic chlorine insecticide, and had been broadly used for cotton pests (such as cotton bollworm) prevention as well as fruit trees pests and maize borer prevention. Heptachlor were mainly used for soil pests and termite prevention, and also used for field pests (such as cotton boll weevil, locust) and vector pests (such as anopheles and flies) prevention. Toxaphene and heptachlor have not been produced or consumed because they were not permitted since 1982. There are no import or export records for toxaphene and heptachlor in the Custom's statistical data<sup>6</sup>.

##### ALDRIN, DIELDRIN and ENDIN

Aldrin, dieldrin and endin have never been produced in large scale in China, and the research or trial production have topped. There are no import or export records for aldrin, dieldrin and endin in the Custom's statistical data<sup>3</sup>.

The production, usage, import and export of these 9 categories of pesticidal POPs are shown in the following table 1. The referential survey of Pesticidal POPs Project of China and Italy indicate that there have been 67 pesticidal POPs (listed in the POPs Convention) plants in China, including those who used to produce or research and those who are producing now. The lists and sites of these plants are shown in Appendix 1.

Table 1 Pesticidal POPs in China

Category	Production Capacity (ton/year)	Production Quantity (ton/year)	Consumption Quantity (ton/year)	Import/Export (ton/year)	Number of plants	Remark
DDT	16000	4000-6000	3000-4500	100-1000 (Export)	2	Existing
HCB	--	1000-10000	--	--	1-2	Existing
Chlordane	--	160	130 ?  >200	30 (Export)	--	Existing
Mirex	--	--	0.3	--	--	Existing

<sup>3</sup> Department of Pollution Control of National Environmental Protection Board of China. The Rotterdam Convention on Introducing Pre-awareness and Agreement Proceeding of Some Dangerous Chemical and Pesticide in International Trade. Aug. 1999

<sup>4</sup> Pesticidal POPs Project of China and Italy

<sup>5</sup> National Environmental Protection Board of China. Global POPs Survey by UNEP Chemicals Agency

<sup>6</sup> General Custom Bureau of China. Annual Bulletin of Imports and Exports. 1981-1996

Toxaphene	3000 (Max quantity in 1970s)			None	Used to produce, stopped in 1980s
Heptachlor	1.0 (1969)			None	Used to produce, stopped in 1980s
Aldrin	None	--	--	None	Used to research, no production
Dieldrin	None	--	--	None	Used to research, no production
Endin	None	None	None	None	No production

Note: “—” denotes no detailed data, and the sources and notes are in the footnotes and text.

## 2.2 Stockpile/Waste

Several environmental monitors disclose that DDT and benzene hexachloride (BHC), which are in stockpile or waste, are still used for agriculture illegally in some areas<sup>1</sup>. Up to now, there has been no particular information on the stock or waste of pesticidal POPs in China.

## 2.3 Polluted Sites

There has been no thorough information about the polluted sites and risk assessments of pesticidal POPs up to now in China.

## 2.4 Production and Residue of POPs as the Intermediate of Pesticides

DDT and HBC are the only two categories of POPs that are registered and produced now in China, and they are used as the intermediates of non-persistent pesticides. Some categories of POPs for special purposes are exempt from the POPs Convention. But, according to the POPs Convention, the discharge of those exempt intermediates should be reduced furthest during the course of production and usage, and the Secretariat should be informed of the stockpile sites, technologies and residua. China has applied for exempting the productions of DDT as the intermediate of dicofo and HCB as the intermediate of sodium pentachlorophenate. The content of DDT in most dicofo is up to 5-10%, and only those produced by few state enterprises can achieve the international standard of 0.1% residuum<sup>1</sup>. The fact above induces

<sup>1</sup> Wei Dou, Xianzhong Zhao. Progress in Environmental Science. Vol.4 (6), 1996

Zulin Zhang, Huasheng Hong. Ocean Environmental Science. Vol.19 (3), 2000

<sup>1</sup> Inquiry on the spot: Tianjin Chemical Plant and Yangzhou Pesticidal Plant. May 2002

contamination of DDT when dicofu is consumed extensively, moreover Chinese exports are affected gravely.

## **2.5 Summaries and Advices**

The data in exist of the production, consumption, import and export of pesticidal POPs are insufficient, so detailed surveys should be carried out before implementation the Convention.

The production and consumption of pesticidal POPs were forbidden in 1980s, but the stockpiles of pesticidal POPs all over the country may be significant pollutant sources, because pesticidal POPs had been produced and consumed in a large quantity in 1950s-1970s in China, as well as because the low level of treatment technologies and management. So, identifying and treating the stockpile/waste will be included when China implement the POPs Convention.

Because of the persistence, bioaccumulation and long-rang transport of POPs, the polluted sites where POPs had been produced, stockpiled or consumed in a great quantity can be important pollutant sources. So identifying and treating the polluted sites will be taken into account when China performs the Convention.

Perfect and close production processes, sites and excellent technologies of “three wastes” (waste water, waste gases and waste solids) prevention are required for controlling the leakage of POPs intermediates during the production processes. However most of the enterprises in China have no those advanced technologies and controlling conditions above, and they will be confronted with technological difficulties when the residual degree of POPs intermediates in termination products should be controlled. For performing the Convention, the production processes, sites and technological conditions of POPs intermediates plants in China will be investigated all-roundly, moreover the leakage during production processes and residue in termination products should been assessed. On the other hand, the correlative managing regulations or criterions need be assessed too.

## **3. Pesticide POPs’ impact and risk on environment in China**

### **3.1 Soil**

According to some reports of related literature, the average concentration of DDT in soil was between 0.2 and 0.3mg/kg in China in 1985. Since the use of some organochlorine pesticides such as DDT and HCB has been banned in 1983, the concentration of DDT and HCB in soil has depressed remarkably in China. A study about the DDT and HCB residue in soil conducted between 1993 and 1999 in Ningbo’s seven counties and cities which are the agriculture production base of China’s eastern developed province Zhejiang shows that: due to the big usage of DDT in 1980s, DDT and HCB residue can be detected in each kind of crop soil in Ningbo region in 1990s; the average concentration of DDT residue ranges from 0.002 to 0.7644 mg/kg, and that of HCB residue is between 0.0006 and 0.0152 mg/kg; DDT’s

pollution level in some samples of the region exceeded the Class II standard of the state's *Environmental quality standard for soils* (GB15618-95) (The standards for DDT and HCB are the same, Class I:  $\leq 0.05$  mg/kg; Class II:  $\leq 0.5$  mg/kg; Class III:  $\leq 1.0$  mg/kg) (Zhaoling etc., 2001)? The analysis of 186 soil samples from the new-established green food production bases in different regions of China's northeast province Liaoning between 1998 and 1999 indicates that the residue of DDT and HCB is very low, and DDT and HCB residue concentrations are 0.022-0.030 mg/kg and 0.007-0.025mg/kg respectively? (Zhang huilan etc. 2001)? In addition, there are also some related sporadic reports about the midwest and northwest region of China, and the DDT residue in soil is low.

### 3.2 Surface water

In terms of the monitoring and studies conducted both in and abroad, the concentration of pesticide POPs such as DDT in water body dropped yearly after their uses have been banned. In recent years, monitoring on organochlorine pesticides has been conducted in the harbors and estuarine sea areas located in southeast and south of China. (Zhang zulin etc. 2000, 2001; Cai fulong etc., 1997) . Besides DDT, they have also detected Dieldrin. According to comparing the concentration of DDT and its decomposed production DDE, we find that there are still some sampling sites in which DDT concentration exceed the Class I standard of the state's *Marine water quality standard* (GB3097-1997) except most of the coastwise regions are up to the Class I standard (DDT+DDE+DDD $< 0.05\mu\text{g/L}$ ) , and there are still some harbors and coastwise regions in which exist new DDT pollution sources, namely, there exist the uses of DDT in such places. In recent years, there are also some monitoring reports about some freshwater lakes and reservoirs in inland regions, most of them indicate that DDT concentrations are far below the DDT trial standard (DDT $< 1\mu\text{g/L}$ ) of the state's "*Drinking Water Quality Standard*". However, the report from Baiyangdian which lies in Hebei province shows relatively high DDT level, and analysis indicates that there has illegal use of DDT stockpile (Dou wei, 1996)? The results of DDT monitoring in surface water are collected in Table 1.

Table 2 Pollution status of pesticide DDT in surface water

Water areas	Monitoring time	DDT level range ( $\mu\text{g/L}$ )	Average level of DDT ( $\mu\text{g/L}$ )	Literature
Baiyangdian, Hebei	1996		0.1	Dou wei etc., 1997
Zhujiang River Estuary, Guangdong	1996	ND—0.086	0.041	Cai fuling etc., 1997
Wujintang Reservoir, Liaoning	1997	ND		Yu jingbo etc., 2000

Fuxian Lake, Yunnan	1998	ND		Lin meiqing etc., 1999
Xiamen Port, Fujian	1998	0.00095-0.0022	0.0014	Zhang zulin etc., 2000
Jiulongjiang River Estuary, Fujian	1999	0.0002-0.063	0.013	Zhang zulin etc., 2001

### 3.3 Sediment

Sediment is the main end-result media of POPs during the process of their transfer and transformation in environment. Under the background that the use of pesticide POPs have been banned or limited for many years, overseas studies indicate that POPs concentration in sediment is the highest compared with the soil, water and air, and sediment in some water bodies, especially lakes in inland, become the pesticide POPs' discharge sources to water and air if there exist no land discharge sources. Existing monitoring and studies on sediment in inland lakes and coastwise sea areas conducted in recent years in China also reflect this fact generally. (Yu jingbo etc., 2000; Zhang zulin etc., 2001) ?

A monitoring study on a reservoir in northeast China shows that, although the concentrations of DDT and HCB in the water body of this reservoir which is the city's drinking water source are far below the state's drinking water quality standard, even below the detection limit, those of DDT and HCB are about 2000 and 100 times of the standard respectively. (Yu jingbo etc., 2000). Studies on the sediment of Zhujiang River delta region in south China indicates that the concentration of DDT in sediment has dropped greatly compared with the results of the early 1980s, but the level is still beyond the minimum value of the overseas chemical meteyard for marine and estuary sediment, and some places can be classified as high risk ecologic region, and the POPs are likely to have affected the environment seriously (Kang yuehui etc., 2000, 2001). The monitoring results of DDT level in sediment of estuary sea areas published by far in China are collected in Table 2. Developed countries such as USA and Canada attach great importance to the monitoring and elimination or rehabilitation of sediment pollution, and they have already begun to do these work. This huge and complex work will be an important action in our country's upcoming fulfillment of the protocol.

**Table 3 The monitoring results of DDT level in the sediment of China's estuary sea areas**

Areas	Monitorin g time	DDT level range (mg/kg)	Average level of DDT (mg/kg)	Literature
Victoria Harbor, Hong Kong	1992	1.38-25.4; (exceptional sites: 59, 97)	10.2	Zhang luoping, 1994

Zhujiang Delta	1997	2.89-90.99	24.04	Kang yuehui, 2000
Zhujiang Estuary in Macao	1998	1.92-39.13	10.53	Kang yuehui, 2001

### 3.4 Food

Great deal use of DDT and HCB in China between 1950s and 1970s has rendered abroad and serious food pollution. However, since the use of organochlorine pesticides such as DDT and HCB has been ceased and the pesticides have decomposed for several years, their concentrations in food already dropped remarkably. According to the follow-up survey and monitoring conducted in China's Zhejiang province between 1972 and 1999, compared with 1985, the concentration of HCB in rice, vegetables, pork, freshwater fish and eggs have dropped nearly 100% in 1990s, and those of DDT have dropped from 20% to 90% (Lu desheng etc., 2000). Monitoring on drinking water (Yang yun etc., 1997; Li lin etc., 1998), tea (Chen senzhang etc., 1996; Fang ling, 1998), mother breast (Li yanhong etc., 2001; Yu huifang etc., 2001; Su jingwu etc., 2001) conducted in recent years indicates that DDT pollution level have depressed largely compared with 1980s, and the level meet the state's existing standard. Food pollution monitoring network of China's Ministry of Health monitored varied kinds of food in state's scope in 2000 (Wang maoqi etc., 2002). The monitoring results indicate that, after 20 years' ban, the pollution of organochlorine pesticides in environment has depressed evidently through the natural degradation of these pesticides, and that at the present time in China, the contents of DDT and HCB in food are all below the state's standard, and the pollution level of organochlorine pesticides in food has dropped and was below the food security limit. The concentrations of DDT in varied kinds of food in China in 2000 are listed in Table 3.

Although most of the existing monitoring reports indicate that the pollution of pesticides such as DDT in China's food has depressed to relative lower level, the impact of POPs pollution in China's food network can not be neglected. The content of DDT in mother breast in China is still higher than that in developed countries and the standards of related international organizations (Yu huifang etc., 2001; Su jingwu etc., 2001). The pollution level of pesticide POPS such as DDT in tea and aquatic products such as fish and seashell is still high, because in some regions of China there are still discharge sources of POPs. (Cong qingmei etc., 2001; Dou wei etc., 1996; Fang zhanqiang etc., 2001; Chen weiqi etc., 2001). Especially, the monitoring on Taihu lake, a big inland freshwater lake which lies in the eastern developed region of China, shows that, after 20 years' ban on the use of organochlorine pesticides, DDT and its degraded products, isomer of HCB, Endrin and Heptachlor epoxide can all be detected in bird eggs in various extent, and that the residue level and detection rate of HCB and DDT are very high (Gong zhongming etc., 2001). Therefore, the potential impact of pesticide POPs' toxicity still exists.

**Table 4 DDT level in various food in China in 2000 (Wang maoqi etc.,**

2002)

Item	Sample No.	Average value			State's standard
		p,p' - DDE	o,p' - DDT	p,p' DDT	
Grain	80	0.0041	0.0070	0.0141	0.2
Vegetable	88	0.0008	0.0013	0.0008	0.1
Fruit	40	0.0008	0.0023	0.0027	0.1
Meat	41	0.0056	0.0013	0.0018	0.2
Fish	30	0.0036	0.0009	0.0025	0.5
Egg	51	0.0025	0.0005	0.0015	1.0
Milk powder	15	0.0006	0.0006	0.0020	Convert to fresh milk
Milk	5	0.0057	0.0255	0.0013	0.1
Vegetable oil	10	0.0002	0.0005	0.0010	0.5
Tea	44	0.0108	0.0138	0.0311	0.2

### 3.5 Summary or advice

As a whole, at present, the monitoring and study about the situation of the impact of pesticide POPs' environment pollution and risk are very short in China. Among the existing literature, most of them focused on only DDT and HCB, both of which were widely-used organochlorine pesticides in China, however, the monitoring report about other pesticide POPs listed in the protocol is very rare. As for the monitoring objects, most of the existing studies concentrated on food and drinking water, and do little on the environmental monitoring of POPs' level and distribution in environmental media; and among the very few studies on environmental media, studies on organochlorine POPs in water body, especially in estuary area, are in the majority, and there are few study on soil and no study on the air media as well as the pollution level of the sites where POPs are produced and stored. Because the purpose of most existing studies are based on the public health consideration, there are no study about the risk impact of pesticide POPs yet. In the coming fulfillment of the protocol, evaluating and monitoring the pollution of China's POPs will be a very important basic work, and it will be a great help to the investigation and disposal of pollution sources, policy establishment and process evaluation in fulfilling the protocol, and public propaganda and education.

## 4. The management of POPs pertained to pesticide in China

### 4.1 Relevant statutes on management of POPs pertained to pesticide

POPs pertained to pesticide belong to toxic chemicals. Due to the provisions in <<the regulations to treat perilous chemicals safely >> and the newly amended <<the regulations for pesticide >>, the relevant statutes and institutions to treat POPs

pertained to pesticide are as followings.

Table 5 important statues and institutions to treat POPs pertained to pesticide

<b>Procedures</b>	<b>Statutes</b>	<b>Bureaus</b>
registration	“the regulations for pesticide”	Agriculture department
Identification of the toxicity	“the regulations to treat perilous chemicals safely”	Sanitation department
production	“the regulations to treat perilous chemicals safely” “the regulations for pesticide”	Economy and trade commission, Quality and Technology Inspection Bureau, Business bureau
management	“the regulations to treat perilous chemicals safely”	Economy and trade commission, Business bureau
import and export	“a notice on compulsory registration of the imported and exported pesticide” “the regulations for the first importance of chemicals and the ordinary import and export of toxic chemicals”	Foreign economy and trade commission, Agriculture department, State Environment Protection Administration, General office of custom
reservation and transportation	“the regulation for the perilous freightage on road”and other ones for the freightage on water, railway, shipping and etc.	Police office, Railway road, Civil Air Transportation, Ministry of communications, Post office, Business bureau,
treatment of solid wastes	“law to protect environment from contamination of solid wastes in People’s Republic of China” “the regulations for obsolete perilous chemicals” (on the way, but not ready)	State Environment Protection Administration
supervision of accidents	“the regulations to treat perilous chemicals safely”	State Environment Protection Administration

#### 4.1.1 The regulations to treat perilous chemicals safely

In China, “the regulations to treat perilous chemicals safely” is the unique comprehensive law to regulate toxic chemicals at present. In January of 2002, “the regulations to treat perilous chemicals safely” was issued, which was a newly amended one with its precursor” the regulations to treat chemically perilous articles “ released in 1987. The regulations offered specific provisions for different procedures of perilous chemicals production, such as reservation, utilization, management, transportation, registration, respective responsibility of different department, emergent succor for accident, lawful duty and etc. ”the regulations for pesticide”



“the regulations for pesticide “ issued and implemented in 1997, which was partly amended in 2002, was a statute directly relevant to POPs pertained to pesticide. It intensified the superintendence for the production, management and utilization, ensured the quality of pesticide up to standard, protected ecosystem and the production of agriculture and forests and maintained the safety of human being and animals. Correspondent regulations, as followings, are given for the registration, production and utilization of diverse pesticides, which included POPs pertained to pesticide.

(1) Registration system for pesticide. As well as imported pesticide, those produced, sold and utilized domestically are commanded to register.

(2) License system for production of pesticide. A license for production of pesticide, issued by Management Department affiliated to State Department for industry manufacture, is compulsory, if the quality is up to the standard of nation and trade, while a license for production of pesticide, issued by Economy and trade commission, is necessary, if the quality is up to the standard of enterprise.

(3) Regulation for dealing in pesticide. When the pesticide belongs to chemically perilous articles, a license for dealing is transacted according to “the regulations to treat perilous chemicals safely”. At the same time, institutions allowed to produce pesticide are limited to the followings: units, affiliated to supply and marketing cooperation, dealing in agricultural produce materials, conservative stations for plant, stations for fertilizer, institutions to generalize the technology for agriculture and forest, institutions to protect forests from insect pests, enterprises to produce pesticides and other units authorized by State Department.

(4) ” the regulations for pesticide”prescribes that the utilization of pesticide should be safe and appropriate.

By the way, the thirty-fifth provision in” the regulations for pesticide”prescribe that any enterprise or individual is not allowed to produce, manage and utilize those pesticide proscribed to produce or nullified registration in national public proclamation.

#### **4.1.2 “the regulation to utilize pesticide safely”**

In”the regulation to utilize pesticide safely”promulgated in 1982, camphechlor, Chlordan, DDT are listed as moderately toxic pesticide and HCH, DDT ? Chlordan are forbidden for fruit tree, vegetable, tea plant, Chinese traditional medicine, tobacco, coffee, pepper, citronella and etc. Chlordan is only allowed to impregnate seed and control underground pests.

#### **4.1.3 “the regulations for the first importance of chemicals and the ordinary import and export of toxic chemicals”**

“the regulations for the first importance of chemicals and the ordinary import and export of toxic chemicals” was issued by an ally of State Environment Protection

Administration, Foreign economy and trade commission, General office of custom in 1994. At the same time,” the list of toxic chemicals proscribed or rigidly restricted by PRC” was released, which was amended in 1998 and first twenty-seven articles included aldrin, dieldrin, Dieldrin, DDT, HCB, Chlordan, heptachlor. Besides, China subscribed “Rotterdam Convention to treat perilous chemicals and pesticide with formerly known and approved steps in international trade”(abbreviated as PIC), in which aldrin, dieldrin, DDT, HCB, Chlordan, heptachlor are listed as POPs pertained to pesticide. All these regulations and conventions are used to control and manage POPs pertained to pesticide.

#### 4.1.4 “Inventory for variety of severely toxic pesticide proscribed by national public proclamation ”

In June 5 of 2002, to control the resources of the pesticide remnant, especially adhered to vegetable, fruits, tea leaves, agriculture department publicized the list of pesticides proscribed by national public proclamation and those severely toxic ones forbidden for vegetable, fruit tree, tea leaves, Chinese traditional medicine. The list of “pesticide proscribed by national public proclamation” included DDT(not allowed to be used in agriculture), camphechlor, aldrin, dieldrin.

## 4.2 Relevant Standards for POPs pertained to pesticide

The existing environmental and sanitary regulations in China, which are related to POPs pertained to pesticide, are listed in table 6. In sanitary regulations, there are standards for the remnants of HCH, DDT for foodstuff, vegetable, meat, eggs and drinking water. In environmental regulations, with the standards of HCH, DDT for fishery, soil and seawater quality set formerly, standards of DDT and Linda for drinking water are set for the first time in the newly amended “standards for ground water quality” (GB 3838-2002)

Table 6 **Relevant standards for environmental and sanitary evaluation of POPs pertained to pesticide in China**

Category	Standards
sanitary regulation	“standards for remnants of HCH, DDT on food such as foodstuff, vegetable, meat, eggs and etc.”GB2763-81 “standards for drinking water quality” (GB5749-85)
environmental regulation	“standards for water quality specific for fishery” (GB 11607-89) “standards for soil condition” (GB 15618-95) “standards for seawater quality” (GB 3097-1997) “standards for ground water quality” (GB 3838-2002)

#### 4.2.1 “standards for remnants of HCH, DDT on food such as foodstuff, vegetable, meat, eggs and etc.”GB2763-81

The series of provisions in “standards for remnants of HCH, DDT on food such

as foodstuff, vegetable, meat, eggs and etc. “(GB2763-81), promulgated in 1981, prescribed that the most remnants of DDT on different foodstuff are as followings. corn = 0.2mg/kg, vegetable and fruits = 0.1mg/k, meat = 0.2mg/kg, fish = 1.0 mg/kg.

#### **4.2.2 “standards for drinking water quality” (GB5749-85)**

The provision in “standards for drinking water quality” (GB5749-85), promulgated by sanitation department in 1985, prescribed that the tentative standard concentration of DDT in drinking water was DDT=0.001mg/l.

#### **4.2.3 “Standards for water quality specific for fishery” (GB 11607-89)**

The provision in “standards for water quality specific for fishery” (GB 11607-89), promulgated by SEPA in 1989, prescribed that the concentration of DDT in water specific for fishery was less than 0.001 mg/l.

#### **4.2.4 “Standards for soil condition” (GB 15618-95)**

The provision in “standards for soil condition” (GB 15618-95), promulgated by SEPA in 1995, prescribed that the concentrations of DDT in the first, second, third class soil are less than 0.05, 0.50, 1.0 mg/kg respectively.

#### **4.2.5 “Standards for seawater quality” (GB 3097-1997)**

“Standards for seawater quality” (GB 3097-1997) needs further check.

#### **4.2.6 “standards for ground water quality” (GB 3838-2002)**

The concentration of DDT should be less than 0.001mg/l, which was regulated in “standards for specific item of ground water source for collective drinking water”, a part of “standards for ground water quality” (GB 3838-2002, which substituted the former GB3838-88), newly promulgated by SEPA in 2002.

### **4.3 Bureaus managing POPs pertained to pesticide in China**

Bureaus managing POPs pertained to pesticide in China are related to those managing toxic chemicals (referencing to table 3). According to the fifth provision in “the regulations to treat perilous chemicals safely” newly amended in 2002, the institutions relevant to the production, management, reservation, transportation, utilization of perilous chemicals, and those to superintend the disposition of obsolete perilous chemicals have to observe the following rules.

(1) According to the regulation, Comprehensive Economy and Trade Department affiliated to State Department and Economy and Trade Department affiliated to different Provinces, Autonomous regions, Cities directly under the jurisdiction of the State are responsible for superintending the safe utilization of perilous chemicals, censoring instauration, reconstruction and enlargement of the enterprises to produce

and reserve perilous chemicals, censoring and localizing the specific enterprises to produce packages and vessels (including tanks for conveyance) for perilous chemicals, issuing a license for dealing in perilous chemicals, registering the domestic perilous chemicals, organizing and corresponding the emergent succor for perilous chemicals and supervising the preceding items. The managing departments of municipal government, which founded sections, and county government are determined by the corresponding governments and have to observe the regulation.

(2) Police office is responsible for controlling the safety of perilous chemicals, issuing the license for buying severely toxic chemicals, censoring and issuing the license for transporting severely toxic chemicals, superintending the safe road transportation of perilous chemicals and supervising the preceding items.

(3) Quality Inspection Department is responsible for issuing license for producing perilous chemicals, the corresponding packages and vessels, superintending the quality of package and vessels for perilous chemicals and supervising the preceding items.

(4) Environmental Production branches are responsible for superintending the disposition of obsolete perilous chemicals, investigating the severe contamination and destruction of ecosystem due to perilous chemicals, monitoring the accident spot caused by perilous chemicals, registering imported perilous chemicals and supervising the preceding items.

(5) Superintending the conveyances and the corresponding institutions relevant to perilous chemicals, Railroad Department and Civil Air Transportation are also responsible for the transportation of perilous chemicals by railway and air. Ministry of communications is responsible for superintending the safety of the conveyances and the transportation relevant to perilous chemicals, qualifying the capacity of the relevant road and shipping companies, the drivers, the sailors, the loading workers and the escorting workers and supervising the preceding items.

(6) Sanitary Service is responsible for rating the toxicity of perilous chemicals and offering medical treatment for casualties caused by perilous chemicals.

(7) According to the licensed document, Industry and Trade Service inspects and issues the Business Charter to produce, manage, reserve and transport the perilous chemicals. At the same time, it has to supervise and manage the marketing activities relevant to perilous chemicals.

(8) Post Service is responsible for supervising and inspecting the mailing of perilous chemicals.

#### **4.4 Summary or proposal**

To eliminate the illicit production and utilization of POPs pertained to pesticide, China should evaluate and improve the efficiency to implement the exiting relevant statues. In addition, to control the leakage of POPs pertained to pesticide during their production and utilization, to resolve the problem relevant to remnants of their intermediates effectively, regulations to monitor and supervise the contamination

and emission of exempted POPs pertained to pesticide demands establishment and amendment.

Obviously the standards set in the existing environmental and sanitary regulations are limited to DDT, HCH, with nothing relevant to other POPs pertained to pesticide. Secondly, because the existing standards are set at the early of 1980, when the pollution of DDT, HCH is serious, a new estimation and amendment according to national and international status may be necessary. Thirdly, furthermore, there are still no standards for those POPs pertained to pesticide in production, which can only be rated by COD. Finally, regulations, to control the residual concentration of the intermediates (DDT ? HCB) of the exempted POPs pertained to pesticide in the products, are needed.

POPs pertained to pesticide are applied in different departments such as agriculture, sanitation, architecture, railway, water conservancy and etc, which results in many relevant managing departments. To control the POPs pertained to pesticide effectively, a collaboration, aiming at the specific new problem, of all relevant functional departments is compulsory.

## **5. Action requirements for implementation of Stockholm convention in China**

Nine of twelve POPs regulated in Stockholm convention belong to pesticide (HCB is also as industrial chemicals and unintentional byproducts)., therefore, the reduction and phase-out of pesticidal POPs will be an important task in implementation of the convention.. Based on the description of aspects of status on pesticidal POPs in China, in this section, the action requirements in China will be identified according to the regulations of the convention.

### **5.1 Investigation and assessment on sources of pesticidal POPs**

The Stockholm convention hold many particular rules on production, use, stockpile, waste, polluted sites and exemption situations of POPs.

For production and use of POPs, it was regulated in Article 3 of the convention that each Party shall 1) Prohibit and/or take the legal and administrative measures necessary to eliminate its production, use and import/export of the chemicals listed in Annex A, and 2) Restrict its production and use of the chemicals listed in Annex B. Eight of nine pesticidal POPs was listed in Annex A, and one, i.e. DDT, was listed in Annex B.

For the production and use of few POPs with exemption, we known that China has applied a few of specific production and/or use exemptions or acceptable purpose for four pesticidal POPs. According to related provisions in Article 3, Annex A and Annex B, Parties shall 1) take appropriate measures to ensure that any production or use

under such exemption or purpose is carried out in a manner that prevents or minimizes human exposure and release into the environment and applicable standards and guidelines shall to be taken into account to minimize the intentional release into the environment, and 2) notify to the Secretariat the information on total production and use of closed-system site-limited intermediate and information regarding the nature of the closed-system site-limited process including the amount of any non-transformed and unintentional trace contamination of the persistent organic pollutant-starting material in the final product. Such information will also be open to public.

For stockpile, waste and polluted sites, according to Article 6 of the convention, Parties should 1) develop appropriate strategies for identifying (i) Stockpiles consisting of or containing POPs and Products and articles in use and wastes consisting of, containing or contaminated with POPs, and 2) endeavor to develop appropriate strategies for identifying sites contaminated by POPs.

Therefore, comprehensive investigation on kinds of sources of pesiticial POPs in China is chiefly needed at the beginning of the convention implementation.

#### **5.1.1 Comprehensive investigation on production, use and trade of pesticidal POPs**

Though some figures was presented in order to give a preliminary description in former sections, current available information of the production, use, import and export of pesticidal POPs in China is very limited and uncertain as we have also mentioned. Comprehensive investigation is needed for start the implementation of the convention in China, with some focuses on east and south areas in China based on basic knowledge.

#### **5.1.2 Investigation on stockpile or waste of pesticidal POPs**

Now, there is almost no information on stockpile and waste of pesticidal POPs in China. Though most pesticidal POPs were prohibited to produce and use in 1980s, it was largely produced and widely used during 1950s-1970s in China. Considering less sound management and treatment capacity, it could be deduced tentatively that a lot of stockpiles or waste of pesticidal POPs still remained across the China. Some environmental monitoring data also indicated such fact. Therefore, the investigation on stockpilee or waste of pesticidal POPs should be undertake across the China since it was widely used geographically.

#### **5.1.3 Investigation and assessment on the pollution control situation of Pesticidal POPs intermediate**

DDT and HCB are mainly produced and use as intermediate for dicofol and PCP in China currently. China has also applied specific exemption or acceptable purpose for this. However, given the uncertainty about closed-system process and high remnant of POPs intermediate, the investigation and assessment should be undertaken on the situation and technology of production and use process of POPs intermediate in minimizing the release and exposure to the environment and workers, and the remnant

in final products.

#### **5.1.4 Study on identification and treatment on pesticidal POPs polluted sites**

Having been a big pesticidal POPs consumption country, the widely distributed sites where pesticidal POPs have been produced, stored or largely used have become potential pollutant sources in China. In future China's NIP of the convention, a long-term strategy should be included for identification and treatment of POPs polluted sites. Therefore, relevant investigations, assessments or researches should be carried out for this purpose in the beginning.

### **5.2 Assessment on relevant management of pesticidal POPs in China**

Controlling pesticidal POPs largely depends on relevant regulations, criteria and mechanism. As mentioned in former relative section, current system of chemical management in China should be undertaken some adjustment or supplement when it is facing a new specific objective for management introduced by POPs convention.

#### **5.2.1 Assessment on regulations and criteria**

Firstly, an assessment should be given to the executive validity of the current relative regulations in China, e.g. now available registration system, production permission and application rules and so on, in order to stop the illegal production, use or trade. Secondly, to study on some feasible adjustment to some pesticidal POPs related regulations according to some specific issues of POPs. Thirdly, it is needed to assess the integrality of current regulations and criteria on pollution control of pesticidal POPs, e.g. emission during the production or use of exempted pesticidal POPs or POPs intermediate and the acceptable concentration of it in waste water and in the final products.

#### **5.2.2 Assessment on management mechanism**

Managerial departments POPs related involve sectors of agriculture, public health, construction, transportation, water conservancy etc. To implement the convention, it is needed to assess the role of each POPs related department and research on cooperation or coordination mechanism among these department.

### **5.3 Monitoring and assessment of pollution and health effects**

It is well known that the monitoring and assessment of pollution and health effects of pesticidal POPs is very important for identification and treatment of pollution sources, policy making for convention implementation, review on the implementation progresses and effects, conducting public awareness and education. That is also encouraged in Article 11 of the convention.

#### **5.3.1 Pollution Monitoring of pesticidal POPs**

As mentioned in former relative section, so far, the environmental monitoring on POPs is very limited in China, and the pollution status of pesticidal POPs is very

unclear. It is needed to conduct both pollution sources monitoring and environmental monitoring on pesticidal POPs, which includes the monitoring on process of POPs production and use, intermediate remnant and polluted sites, and the concentration in water, soil, sediment, and air. That will be a necessary and fundamental activity in China during the implementation of the convention in future.

### **5.3.2 Health effect monitoring and assessment of pesticidal POPs**

The purport of the POPs convention is to protect the ecosystem and health of human being. It is also needed to monitor, assess and research on the levels of pesticidal POPs in human bodies, exposure ways, and chances, and measures for reducing the exposure risk.

## **5.4 Investigation and assessment on alternative product / technology of Pesticidal POPs**

According to literature, many alternative products/technologies have been developed for DDT, chlordane and mirex at present. However, there are scarce report about alternative products/technologies applied for above pesticidal POPs that are still in production and use in China. Another fact is that whether one kind of alternative product/technology can be successfully applied in China also depends on the economic, technical and managerial situation. Research or development activities of POPs alternative are also encouraged by the convention in Article 11. Therefore, it is needed to investigate and assess the alternative products/technologies available in the world and the feasible application in China and to research and develop new alternative product/technology within the possible capacity of China.

## **5.5 Public awareness and participation**

Actions of pesticidal POPs reduction and phase-out involve kinds of stakeholders. It was regulated in article 10 of the convention that each Party should promote and facilitate public Awareness, education, participation and training about the POPs convention. Now, the awareness or knowledge of POPs convention is only limited in few governmental departments and research institutes. Therefore, it is needed to promote and facilitate public awareness and education among producers, operators, consumers, institutes, local governments, nongovernmental organizations and public populations, about the knowledge on environmental and health issues of POPs and related policies and actions, and discuss the methodology, ways and manners of public participation.



**Appendix 2: Primary assessment report on PCBs in China**

**Appendix 2**  
**PRIMARY ASSESSMENT REPORT ON**  
**PCBs IN CHINA**

**Unedited draft English text of final report in Chinese**

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## 1. Foreword

Because POPs have difficult degradability, high biological accumulation property and biological toxicity, and characteristic of long distance transfer, extensive attentions of international society is focusing on POPs. To control effectively global POPs pollution and strengthen international exchange and cooperation, United Nations Environment Programme (UNEP) launches a international synergetic action to reduce and/or eliminate the discharge of twelve kinds of POPs through a series of measures and attain the goal of protecting human health and environment. After representatives of various countries consult and negotiate repeatedly, ninety countries signed the <<Stockholm Convention>> controlling POPs pollution in May 2001. China is one of the first batch counties signing the convention. The convention stipulates that various contracting parties should draw up within two years their national implementation programmes (NIP) of controlling POPs pollution that accords with the duty of performance, and designate global environment fund (GEF) as temporary fund of convention to support the activities relevant to the duty of performance developed by developing countries. In accordance with the requirements of GEF program, if the project fund one country needs exceeds USD 0.5 million, it should make first-phase preparations (PDF-B) for drawing up NIP.

According to the POPs production and management features in China, the PDF-B in China includes policy and institution section, insecticide section, polychlorinated biphenyls (PCBs) section and byproduct section. In accordance with the requirements of <<Stockholm Convention>> and practical situation of POPs in China, this project develops the work of PDF-B stage in PCBs section.

As a kind of important pollutant in POPs, PCBs has long history of production and extensive service in China. However, the general quantity and distribution of PCBs wastes, present service and storage conditions of PCBs and relevant products and environmental pollution status and developing trend of PCBs in China are not shown by any statistical data and research report in China itself. Meanwhile, as compared with the convention requirements, China has a long way to go in the policy, law and management system controlling PCBs pollution, and in the performance capability and performance condition of various relevant institutions. It is obvious that that China carries out the Stockholm convention shoulder heavy responsibility. Lots of first-phase work should be developed for drawing up the national implementation plan (NIP) of POPs. As a component part of PDF-B work, this project includes

principally following contents: preliminary investigation of PCBs production, service and storage in China; preliminary analysis of the status and trend of PCBs pollution in China; understanding and preliminary assessment of PCBs management policies and executive capability in China; and activities and fund investment to be developed for drawing up NIP in China.

## **2. PCBs Production, service and Storage in china**

### **2.1 PCBs Production in China**

The productive life for China to produce polychlorinated biphenyls range from 1965 to 1974. Its total output is 10,000 tons where 9,000 tons is trichlorinated biphenyl and 1,000 tons is pentachlorinated biphenyl.

Main manufacturers producing trichlorinated biphenyl in China are Xian Chemical Plant, Shanghai Electrochemical Plant and Suzhou Solvent Plant.

Main manufacturers producing pentachlorinated biphenyl in China are Shanghai Sanzao Chemical Plant.

### **2.2 PCBs (FINISHED PRODUCT) Production in CHINA**

Trichlorinated biphenyl is principally used for the impregnant of power capacitor. The enterprises using trichlorinated biphenyl to manufacture power capacitor include principally Xian Power Capacitor Factory, Wuxi Power Capacitor Factory, Jinzhou Capacitor Factory, Zhejiang Shangyu Capacitor Factory and Guilin Capacitor Factory. Their prime products are YL, YLW series phase shift power capacitors, CL series serial power capacitors, and RL, RLSL series electrothermal power capacitors. China started production in 1965 and stopped production in 1975. Calculated by about 11kg/set of PCBs consumption for average 25 kilovar capacitor/set, 9,000 tons of PCBs can produce theoretically 0.8 million sets of capacitors. Taking the utilization and losses of raw materials into account, estimated by 90-95% consumption of raw materials, total output of domestic power capacitors is about 0.7-0.75 million sets.

Pentachlorinated biphenyl is principally used for the additive of paint. Main enterprises using pentachlorinated biphenyl as paint additive include Tianjing Paint General Factory, Shanghai Zhenhua Paint Factory, Xian Paint Factory, Shanghai Paint Factory, Guangzhou Paint General Factory, Dalian Paint Factory, Gansu Paint Factory

and Harbin Paint Factory. Their prime products are aminogroup special purpose paint of sewing machine, aminogroup special purpose paint of bicycle, aminogroup laque of integrated hood, nitril varnish of cable, perchloroethylene fireproof varnish and anticorrosive varnish. At present, we have no way to pinpoint the sales units of PCBs paint from the machine accounts of above enterprises, but we firmly believe that these paints open to use have lost entirely in the environment.

Present production status of other polychlorinated biphenyl finished products in China still waits for further investigation.

### **2.3 PCBs IMPORT/EXPORT IN CHINA**

Little information is obtained about the import situation of polychlorinated biphenyl raw material and finished product in China. But according to the calculation of domestic capability of transformation of electric energy in 1975, national PCBs capacitor consumption should be about 1.15 million sets. Subtracting 0.7-0.75 million sets of homemade capacitors, the quantity of imported PCBs capacitor should be 0.4-0.45 million sets. The carry-in weight of PCBs is about 4,000-5,000 tons (PCBs weight brought by imported PCBs transformers not included). Moreover, according to incomplete statistics, China Tianjing Paint General Factory produced paint containing polychlorinated biphenyl at the end of 1950s. At that time, China did not produce polychlorinated biphenyl. Therefore, the polychlorinated biphenyl used in the production of paint come undoubtedly from import, which is the earliest case of importing polychlorinated biphenyl raw material, as we know. In addition, we found the record that China National Technical Import and Export Corporation (CNTIC) imported polychlorinated biphenyl in 1965.

The import time of equipment containing polychlorinated biphenyl in China is mainly in the seventies and eighties when imported polychlorinated biphenyl are mainly concentrated in the special purpose transformers and power capacitors that are formed a complete set for large-size imported equipment. A small quantity of polychlorinated biphenyl is imported in the form of hydraulic oil or heat conduction oil. For example, Liaoyang Chemical Fibre Factory, Wuhan Iron and Steel Company and Baoshan Iron and Steel Works have imported polychlorinated biphenyl transformers and capacitors whose imported countries are French, Germany, Japan and Belgian. In addition, Shenyang Institute of Environmental Sciences detect polychlorinated biphenyl from hydraulic oil at hydraulic station of 480T E incinerator

imported from America. Although the information we master at present is scattered, yet the information indicates that the PCBs import and main import route and mode exist in China. Detailed information about China PCBs import still waits for further work.

## 2.4 PCBs SERVICE CONDITION IN CHINA

PCBs is used in following three modes in China, i.e., closed use, semi-closed use and open use.

Through the comparison of above three modes at home and abroad, this report introduces domestic PCBs service condition.

Table 1 Service condition of closed PCBs

Usage	Domestic situation	Foreign situation
Transformer	Used	Used
Power capacitor		
? Reactive compensation capacitor in electric power system	Used	Used
? Lighting current stabilizer	Used	Unknown
? Motor's start-up capacitors used in refrigerator, heater, air conditioner and electric hair dryer	Used	Used but few used information
? Capacitors used in electronic products such as TV and microwave oven	Used	Few quantity
Motor (special liquid cooled motor)	Used	Unknown

Table 2 Service condition of semi-closed PCBs

Usage	Domestic situation	Foreign situation
Heat conduction oil: used mainly in inorganic chemical engineering, organic chemical engineering, plastic synthesis and petroleum refining industries	Used	Unknown
Hydraulic oil: used mainly in mining industry and metalworking industry	Used	Unknown
Vacuum pump: used mainly in electronic device production, laboratories, research institutions, and wastewater discharge industries.	Used	Unknown
Electrical equipment switch: used in power facility	Used	Unknown
Voltage stabilizer: used in power facility	Used	Unknown
Liquid insulation cable: used in power facility	Used	Unknown

Table 3 Service condition of open PCBs

Usage	Domestic situation	Foreign situation
Lubricating oil: ? High temperature lubricating oil ? Cutting oil ? Lubricating oil for compressor	Used	Unknown
Exterior paint: ? Paint ? Surface treatment for textile industry ? Carbon-free duplicating paper ? Fireproof paint ? Dustproof control	Used	Used Unknown No used Used Unknown
Additive ? Special purpose additive ? Waterproof additive	Used	Unknown
Plasticizer ? Gaskef seal ? Connecting filling of cement concrete ? PVC ? Rubber seal	Used	Unknown
Ink ? Dye ? Printing ink	Used	Used
Other uses ? Heat insulating material ? Insecticide	Used	Unknown

The service sites of trichlorinated biphenyl used as reactive compensation power capacitor and pentachlorinated biphenyl used as paint additive are shown clearly in above practical service conditions of China PCBs, which are the main service areas of China PCBs. Domestic PCBs is basically used in such aspects. The polychlorinated biphenyl used in transformer comes from importation. Although we know to a certain extent the service condition of imported PCBs transformer, yet its overall situation is not clear. Little information about polychlorinated biphenyl used in other places is obtained. Even if it is used, its sources may come from importation, but its consumption is not large, which should be further checked and investigated from now on.

Because we have no way to pinpoint the sales places of capacitors from the

machine accounts of manufacturers, as to domestic distribution of these capacitors, we can regress and calculate their corresponding capability of transformation of electric energy in accordance with power consumption in various areas in those days, and calculate the distribution quantity of domestic PCBs capacitors. The service and distribution conditions of PCBs power capacitors in various regions of China are shown in table 4.

Table 4 The service and distribution conditions of PCBs power capacitors in various regions of China

Region	Capability of transformation of electric energy (ten thousand kV·A)	Quantity of power capacitor (ten thousand sets)	Percentage of distribution (%)
Whole country	14252.3	115.3	
North China region	2554.5	20.4	17.7
Northeast region	2977.2	23.8	20.6
Eastern China region	3547.9	28.4	24.6
Central south region	2585.8	20.7	18.0
Southwest region	1400.6	11.2	9.7
Northwest region	1346.4	10.8	9.4

The productive life of polychlorinated biphenyl capacitors in China ranges from 1965 to 1974. Calculated in accordance with the service life of 15 years, the years, when such capacitors are out of use, should be from 1980 to 1990. Taking good running and maintenance of few capacitors into account, their service lives may exceed 20 years. Such capacitors will gradually be out of use in recent years. The years China imported polychlorinated biphenyl transformers are mainly in 1970s and 1980s, when polychlorinated biphenyl transformers may be included in imported large-size integrated mechanical and electrical equipment in China. Calculating by 23 years' service lives, the years such transformers are out of use should be from 1995 to 2005.

## 2.5 PCBs STORAGE CONDITION IN CHINA

From 1980s to the beginning of 1990s, China began storing disused PCBs power capacitors. The productive life and service life of PCBs capacitors were just the peak



time when China PCBs power capacitors were out of use, which was also the time horizon when the storage capacity of China PCBs was the maximum. However, as the storages at that time were made in regions or by enterprises themselves, there has no healthy and effective system of reporting to high bodies. Although nationwide PCBs investigation was developed later, yet the developing situations in various places were six to one. Therefore, the investigation on the storage condition of PCBs will become future focal point of PCBs performance activities. At present, in terms of investigated PCBs storage condition, preliminary assessment is as follows:

It is found through national investigation of 40 PCBs storage sites that the storage of PCBs power installation and their wastes are in following forms:

- Concentrative sealing-up-for-keeping (SK) in caves. The SK objects are mainly capacitors and PCB s pollutants. The site selection, design, construction and construction and management of such kind of SK sites are normative. The designed SK years are 20 years. However, because the problems of rock mass water percolation are not considered sufficiently during design, the ponding phenomenon in different extents occurs inside cave. The hidden pollution trouble exists due to the overflow drain of PCBs sewage. At present, the time of such kind of SK sites has been close to the SK years of 20 years. Representative SK sites are Beijing Yanqing PCBs SK Sites (processed) and Guansu Tianshui SK Sites.
- Concentratively underground SK: The SK objects are mainly PCBs capacitors and PCBs pollutants. Such kind of SK is to seal normally the PCBs capacitors and pollutants in the reinforced concrete groove, bury and label them in underground. The design years of such kind of SK are 20 years. The problem of underground water percolation exists in such mode of SK. We find the phenomenon in several storage sites that capacitors and PCBs wastes are soaked in water. The environmental risk of such kind of SK mode is larger than the cave SK mode. Moreover, owing to the change of land planning and laid waste of label, the phenomenon that PCBs underground SK sites are covered under other facilities or that the SK sites can not be found may occur. Representative SK sites are Dalian Administration of Power Supply PCBs SK Sites and Zhejiang Shaoxing Administration of Power Supply SK Sites.
- Temporary storage inside the factory site. The SK objects are mainly PCBs capacitors, PCBs transformers and PCBs oil. PCBs capacitors are normally sealed by a cement wall in a designated area. The SK years should not exceed three years in accordance with stipulations. However, the SK time of many PCBs capacitors exceeds three years. PCBs transformers are normally temporarily sealed in the

factory sites where rainproof facilities are arranged for those factories with good conditions. PCBs oil is normally kept in storage in the steel tank. Such storage mode is found only in Guilin Capacitor Factory and Xian Capacitor Factory.

To sum up, if the storage management is of normalized management, PCBs capacitors, transformers and pollutants should all be sealed in designated places. Moreover, each city should at least have a SK site. According to our practical investigations, relevant departments in some provinces and cities lack consciousness for PCBs, do not start management and basically have no information. The relation of investigated PCBs data to countrywide PCBs data is included in table 7.

Table 5 Relation table of preliminarily investigated polychlorinated biphenyl data with countrywide polychlorinated biphenyl data

Quantity of investigated provinces (piece)	16
Ratio of quantity of investigated provinces to total of countrywide provinces (%)	50
Total of investigated capacitors (set)	30000
Ratio of total of investigated polychlorinated biphenyl to total of countrywide polychlorinated biphenyl (%)	4
Total of investigated transformers (set)	35
Quantity of involved natural storage sites (piece)	40
Quantity of labeled storage sites (piece)	8
Ratio of labeled storage sites to entire storage sites (%)	20

Preliminary investigation results indicate that it is arduous to investigate polychlorinated biphenyl in China. Although the quantity of investigated provinces have accounted for 50% of total of countrywide provinces, total of investigated polychlorinated biphenyl accounts for only 4% of countrywide total. Above facts indicates that many provinces do not manage the polychlorinated biphenyl; The working depth of those provinces managing polychlorinated biphenyl waits for further strengthening.

### 3. Primary Analysis of PCBs Pollution Status and Trend in China

#### 3.1 PCBs ENVIRONMENTAL EXPOSURE ROUTE IN CHINA

After it was synthesized for the first time in laboratory in 1881, PCBs finds wide application in the additives of impregnant of power capacitors, dispense agent of lubricating oil and cutting oil, paint, pesticide, plastics and adhesive. Analyzing from

the application of polychlorinated biphenyl and the relation of environmental exposure, the environmental exposure route is divided into three categories:

- Controllable closed system. Polychlorinated biphenyl is used as dielectrics of transformers and capacitors. As long as the transformers and capacitors are designed properly during production and service process, they are normally not apt to leak and cause environmental exposure.
- Uncontrollable closed system. Polychlorinated biphenyl is used in heat conduction and hydrosystem. Although the system is closed in technique, it still may leak and need a small quantity of supplement. Thus, it is also difficult to recover thoroughly. The system may be apt to cause losses and pollution accidents.
- Consumptive use. Polychlorinated biphenyl is used in a variety of dispense agents and additives of lubricating oil and paint. It is lost in the environment due to its open use.

Main exposure mode of polychlorinated biphenyl is controllable closed system, according to the quantity distribution of polychlorinated biphenyl used in above three modes. Next exposure mode is consumptive open system and uncontrollable system. 90% of PCBs used in China is used in the impregnant of power capacitors, which is a controllable closed system, while 10% of them is used in consumptive open system of oil additive. It is obvious that of said various service routes of PCBs, PCBs used as impregnant is the most important pollution source of PCBs in China.

Tables 6 Use level of PCBs in three use patterns (%)

Country	Controllable closed system	Uncontrollable closed system	Consumptive open system
America	56	2.0	42
Japan	65.4	11.3	23.3
China	90	-	10
Average	70.5	4.4	25.1

The pollution source and pollutant pathway of polychlorinated biphenyl can be analyzed in three aspects of production, service and storage.

- In production aspect. The production of polychlorinated biphenyl industrial chemicals and manufacturers of corresponding products are all the pollution sources of polychlorinated biphenyl. The discharge of technological exhaust gas and technological wastewater in these factories are its important pollutant pathway. Over 90% of domestic polychlorinated biphenyl are used in manufacturing polychlorinated biphenyl power capacitors. Therefore, seeing from the production

and processing links of PCBs and its products, chemical enterprises producing PCBs and manufacturers of PCBs electrical installations are important pollution source. Investigation shows that after a factory producing PCBs capacitors in China stops producing PCBs capacitors for 25 years, the PCBs content in the deep soil of its factory site is 18 times as much as that of topsoil (such investigation was made by Shenyang Institute of Environmental Sciences in Sep.2001).

- In service aspect of products containing PCBs. A variety of products manufactured by PCBs accompany with the loss of polychlorinated biphenyl and enter environment during its service process. Although the content of open use products containing polychlorinated biphenyl such as plastics, paint, adhesive and printing ink presswork adding polychlorinated biphenyl is relatively low, they often have close relationship with people's routine lives and are difficult to recover. Their use and disuse can accumulate in environment and possess extensive diffusibility, which is a nonnegligible route of PCBs face source pollution.
- According to preliminary statistics, when China started producing PCBs in 1965 and stopped production in 1975, over 1000 tons of pentachlorinated biphenyls was used in open use products such as paint. These PCBs have basically entered permanently the environment and have no way to recycle and control.
- ? The open use products are in such a manner, closed use products often have bigger hidden trouble and cause serious pollution accidents due to misapplication and misgovernment. PCBs, as a variety of impregnants of power capacitors, is one of the maximum application routes. Extensive application sites of these power capacitors are all the pollution sources of polychlorinated biphenyl pollution factors. Long-term use and improper working conditions may lead to the leakage of polychlorinated biphenyl in capacitors. In particular, misgovernment of capacitors discarded as useless, disassembly, sell-off, dumpage, incineration and landfill without permission lead to serious losses of PCBs and cause environmental pollution.
- As mentioned above, 9,000 tons of trichlorinated biphenyls produced between 1965 and 1975 are used as impregnant of power capacitors. Cumulative output of PCBs capacitors ranges from 0.7 million sets to 0.75 million sets. In addition, from 1950s to 1970s, China imported from different routes 0.4-0.5 million sets of PCBs capacitors, which distribute in urban and rural transformer substations. As people lack historically consciousness of PCBs harmfulness, we have no way to assess their effect on environment under the condition of not knowing the inside story and lacking effective management.
- ? In the aspect of discharge and storage of wastes containing PCBs. The

conditions and modes of SK sites in various regions have large differences due to limited technique and economic condition at that time. In particular, because there has no restriction of corresponding laws and statutes and lacks management after SK, a number of difficulties are met in the investigation of storage sites, storage capacity, and storage mode in today after they are sealed up for keeping for 15 to 20 years.

The seriousness of such problems is more than that. What is more important is that some storage sites or landfill sites are turned into other usage due to lacking safety SK measures and management. As some storage sites lack effective measures of antileak and antiseepage, the capacitor shells corrode and hollow up, causing outflow of PCBs liquid and serious environmental pollution.

Above problems change primarily closed use PCBs into open use PCBs. Hence, such change easily causes a mass of PCBs to go into the environment. Such change becomes an important pollutant pathway of PCBs. Preliminary monitoring of PCBs storage sites shows that PCBs leakage in some PCBs storage sites have brought obvious influence on its ambient environment factors such as soil, water body and river bed mud.

### 3.2 PCBs ENVIRONMENTAL POLLUTION STATUS IN CHINA

Above analysis indicates that from the date of starting production and use to present day in China, PCBs has entered and is entering the environment in different modes and routes. As China still does no investigate and monitor PCBs environmental pollution status on certain scale and also does not issue corresponding environmental quality standard, the degree of PCBs environmental pollution in China can not be assessed quantitatively. The data gathered at present is scattered and local.

The investigation and monitoring results of PCBs environmental pollution in several different types of regions (sites) in China are as follows, thereby we can have a preliminary understanding of PCBs environmental pollution status in atmosphere, water body and soil.

Table 7 PCBs environmental pollution status in several typical regions (sites) of China

Environment al medium	Regions or objects investigated and monitored	PCBs content in medium	Investigat ion or monitorin g time

Water body	Ground water body	31-129	1991-1992
	No.2 Songhua River blowoff	3.0-85	1989
	Surface seawater at Jiangquan small wharf in Qingdao city	9.02-12.68	1983
	Submontane river at PCBs SK sites in some regions (200M away from SK sites)		
Water body bed mud	No.2 Songhua River bed mud	25.4-70.3	1989
	Industrial drainage canal bed mud in several paper mills in Baoding city	31.1-510.9	1992.11
	Submontane river bed mud at PCBs SK sites in a region	349.8	2001.9
	Riverway bed mud near a PCBs contaminated area	691	1994
	Riverway bed mud around a PCBs SK site	116.4*10 <sup>3</sup> -183.3*10 <sup>3</sup>	1991
Soil	Tibetan soil unaffected by direct pollution of PCBs	0.625-3.501	1985
	Environment soil in Shenyang city proper	10-15	1991-1992
	Environment soil around PCBs SK sites in a region	37.1-593.0	2001.9
	Agricultural soil around a PCBs SK site	170-2930	1991
	Directly polluted soil in PCBs SK sites of a region	1192*10 <sup>3</sup> -4544.8*10 <sup>3</sup>	1991
Atmosphere	Atmospheric environment in five districts of Shenyang	70-130	1991

Note: the concentration units of PCBs contents in water body and atmosphere in table are ng/l and ng/m<sup>3</sup>; the concentration units of PCBs contents in water body bed mud and soil in table are µg/kg.

### 3.3 PCBs ENVIRONMENTAL PROBLEMS AND POLLUTION TREND AT PRESENT STAGE IN CHINA

Based on gradual recognition of PCBs dangerousness, since relevant departments issued relevant documents of stopping the production of polychlorinated biphenyl power capacitors and preventing the environmental pollution of polychlorinated biphenyl in 1974, they sealed up and disposed the out-of-use and stored PCBs power capacitors. At present, the PCBs production and the links of production and use containing PCBs products have gradually become the pollution source and pollutant

pathway.

However, being limited to economy and technique, temporary disposal requirements of temporary SK are put up only for out-of-use PCBs power capacitors for many years. Due to factors such as consciousness of SK, SK conditions, measures, expenses, management and time limit, many problems occur on the aspect of SK quantity and effect.

- Some SK sites are simple and crude in conditions and do not construct in accordance with SK requirements. Some SK sites even do not possess basic measures of antiseepage and antileak.
- When sites are selected, some SK sites are giddy-headed and do not take the environmental conditions of PCBs storage sites into account. Some SK sites have bad natural environmental conditions and are apt to cause rainwater filling and seepage and loss. Some SK sites do not take the goal of environmental protection around SK sites into account.
- Environmental security assessments are basically not made for PCBs SK sites; SK process lacks management. Majority of SK sites is basically in the state of unattended management and conduct rarely regular environmental monitoring.
- Long SK years (normally over 10-20 years). Aged facilities. Serious leakage in some regions. Potential hidden environmental pollution troubles stand out increasingly.
- Thus It can be seen that PCBs SK sites and their environment exposure factors have become and are becoming current important pollution source of PCBs and main pollutant pathways in China, and are main problem of current PCBs environmental pollution in China. Because majority of wastes containing PCBs currently stored in China have exceeded their predicted storage time limit, their potential threat on environmental leak will rise year after year if timely and powerful measures are not taken for pollution control and final disposal. The point source pollution caused by such situation will take on an increasing trend in both frequency and hazardous extent.
- Hidden environmental troubles of a small quantity of in-service PCBs capacitors
- Calculating the out-of-use years of PCBs capacitors in China, the large-size integrated mechanical and electrical equipment imported in 1970s and 1980s that are finally out of use may contain PCBs transformers whose out-of-use years should range from 1995 to 2005. Owing to lacking on-line information of these transformers at present, it is very important to check them and strengthen

management.

## **4. GENERAL SITUATION OF PCBs MANAGEMENT POLICIES AND EXECUTIVE AGENCIES IN CHINA**

### **4.1 CURRENT SITUATION OF PCBs MANAGEMENT POLICIES IN CHINA**

Chinese government attaches much importance to PCBs management and its control measures basically synchronize with international environmental control. Our country stopped PCBs production at the beginning of 1970s, limited PCBs import at the end of 1970s, drew up administrative provisions preventing PCBs pollution and standards of pollution control at the beginning of 1990s, launched a countrywide PCBs investigation in the middle of 1990s and drew up incineration control standard in 2000. Relevant specific contents are as follows:

In March 1974, former National No.1 Ministry of Machine-Building Industry issued the “Circular on Changing Impregnant of Power Capacitors [Jidian 226 (74)]” which stipulated to stop using trichlorinated biphenyl to manufacture power capacitors.

In August 1979, former State Economic Commission and Environment Protection Committee under the State Council issued jointly the “Circular on Preventing Pollution Problems of Polychlorinated Biphenyl Harmful Substance [Jingji (1979) 225]” which stipulated to control pollution of polychlorinated biphenyl and did not import electrical installation with polychlorinated biphenyl as the medium. In individual exceptional circumstances when import is required indeed, the import in such case should be reported to the competent authorities under the State Council.

In March 1991, the State Bureau of Environmental Protection and State Ministry of Energy issued jointly the “Regulations on Preventing the Environmental Pollution of Electrical Installation Containing Polychlorinated Biphenyl and Its Wastes”. Such stipulation was the first special stipulation on controlling all-sidedly the PCBs pollution in China and plays an important role in directing domestic management of PCBs. Three appendixes were issued together with such stipulation, i.e., appendix 1 <<Registration Form of Electrical Installations Containing Polychlorinated Biphenyl>>, appendix 2 <<Design Regulation of Temporary Storage Warehouse and



Concentrative SK Warehouse of Wastes Containing Polychlorinated Biphenyl (PCBs)>> and appendix 3 <<Controlling Value of Water Quality and Soil Pollution Containing Polychlorinated Biphenyl (PCBs) (Interim)>>.

The definition of polychlorinated biphenyl and its wastes, the collection, storage, transformation and processing of polychlorinated biphenyl and its wastes and the management of their import activities and the legal liabilities of producers and governmental supervisors of polychlorinated biphenyl and its wastes were all stipulated in detail. Meanwhile, such regulation stipulated that the working units having polychlorinated biphenyl electrical installations must faithfully report to local departments of environmental protection in accordance with the technical requirements of appendix 1 <<Registration Form of Electrical Installations Containing Polychlorinated Biphenyl >>; the water body and soil polluted by polychlorinated biphenyl should be used and managed by referring to appendix 3 <<Controlling Value of Water Quality and Soil Pollution Containing Polychlorinated Biphenyl (PCBs) (Interim)>>; the site selection and design of temporary storage warehouse and concentrative SK warehouse of polychlorinated biphenyl must conform to appendix 2 <<Design Regulation of Temporary Storage Warehouse and Concentrative SK Warehouse of Wastes Containing Polychlorinated Biphenyl (PCBs)>>. The storage years of temporary storage warehouse and concentrative SK warehouse should not exceed respectively three years and twenty years, and the polychlorinated biphenyl wastes sealed up for keeping must be retrievable.

In March 1992, Based on appendix 3 <<Controlling Value of Water Quality and Soil Pollution Containing Polychlorinated Biphenyl (PCBs)>> of the “Regulations on Preventing the Environmental Pollution of Electrical Installation Containing Polychlorinated Biphenyl and Its Wastes”, the State Bureau of Environmental Protection and State Bureau of Technical Supervision drew up and issued (GB13015-91) <<Pollution Control Standards of Wastes Containing Polychlorinated Biphenyl >>. Such standard stipulated the pollution controlling value of wastes containing polychlorinated biphenyl and their disposal methods. Its applicable scope includes the collection, storage, transportation, recovery, processing and disposal of polychlorinated biphenyl wastes. Specific contents of such standard include:

- Harmful wastes whose contents of polychlorinated biphenyl range from 50mg/kg to 500mg/kg can be disposed by safety landfill technique or by high temperature burning technique.

- Harmful wastes whose contents of polychlorinated biphenyl are more than 500mg/kg must be disposed by high temperature incineration technique.
- When we temporarily have no way to dispose the wastes containing polychlorinated biphenyl (content of polychlorinated biphenyl over 50mg/kg) , they should be stored temporarily or sealed up for keeping. But the construction of concentrative temporary storage and SK warehouse must conform to relevant stipulations of administrative competent authorities of environmental protection of local people's government.
- Such standard has also an appendix, i.e., appendix A: Detection Methods of Polychlorinated Biphenyl (PCBs) in Wastes.

In December 1995, the State Bureau of Environmental Protection and Ministry of Power Industry issued jointly the "Circular on Reporting Countrywide Polychlorinated Biphenyl Electrical Installation and Its Wastes" and ordered relevant units to coordinate the countrywide investigation on use, storage status of polychlorinated biphenyl electrical installation. Shenyang Institute of Environmental Sciences conducted preliminary investigation of polychlorinated biphenyl electrical installation and its wastes in important provinces in 1995-1996, according to the requirements of such circular.

In March 2000, the State General Bureau of Environmental Protection issued (GWKB2-1999) <<Incineration Pollution Control Standard of Hazardous Wastes>>, which besides stipulating definitely the site selection principle of incineration facility site of hazardous wastes, basic technical performance and indexes of incineration, maximum allowable discharge limit value of atmospheric pollutants incinerated and discharged, disposal principle of incinerating relicts and corresponding environmental monitoring, stipulated exclusively the technical indexes of incineration of polychlorinated biphenyl, i.e., the detention time of flue gas at 1200? is over 2 seconds, and the combustion efficiency and rate of burn-down removal are over 99.9% and 99.9999% respectively.

In January 1998, the state issued the <<Directory of Hazardous Wastes>>. The tenth class among total 47 hazardous wastes is polychlorinated biphenyl.

Above directory is one of the legal directories of hazardous wastes in China. Relevant statutes applicable to the management of hazardous wastes are equally applicable to the management of polychlorinated biphenyl. The << Environmental Control Law of Solid Wastes Pollution of the People's Republic of China >> issued in

October 1995 is the first special statute of environmental protection concerning all-sided management of solid wastes (including hazardous wastes) and is also the supreme statute for the management of hazardous wastes in China. Its relevant contents are extracted as follows:

Article 43: The administrative competent authorities of environmental protection of the State Council together with relevant departments of the State Council should draw up the name list of hazardous wastes and stipulate united discrimination criterion, discrimination method and identification mark of hazardous wastes.

Article 44: Identification marks must be set up for vessels and packing of hazardous wastes and in facilities and sites of collecting, storing, transporting and disposing hazardous wastes.

Article 45: The units producing hazardous wastes must report and register in accordance with national relevant stipulations.

Article 49: The units engaging in the operating activities of collection, storage and disposal of hazardous wastes must apply and get licenses for operation from the competent authorities of environmental protection of people's governments above county level. The State Council shall stipulate specific managerial methods.

Prohibit engaging in the operating activities of collecting, storing, and disposing hazardous wastes without license for operation or not conforming to the stipulation of license for operation.

Forbid providing hazardous wastes or entrusting the units having no license for operation to engage in the operating activities of collection, storage and disposal.

Article 51: Those units that transfer hazardous wastes must fill in the transfer list in accordance with national relevant stipulations and report to the administrative competent authorities of environmental protection of local people's governments above county level at the shift-out site and receiving site of hazardous wastes.

To carry out the << Environmental Control Law of Solid Wastes Pollution of the People's Republic of China >> and strengthen effective monitoring of transferring hazardous wastes, the State General Bureau of Environmental Protection issued in June 1999 the <<Managerial Methods of Transfer List of Hazardous Wastes>>. The implementation of such managerial method integrates the managerial system of emergence, collection, transportation, storage and disposal processes. Such

managerial method provides a forceful legal guarantee for the management of overall process of hazardous wastes including polychlorinated biphenyl. Meanwhile, to control all-sidedly the environmental pollution of storage process of hazardous wastes, the State General Bureau of Environmental Protection issued in 2001 the (GB18596-2001) <<Pollution Control Standard of Hazardous Wastes Storage>>, which stipulated definitely and concretely the site selection of hazardous wastes storage sites, packing and storage vessels, and environmental marks.

In a word, macroscopically, the execution of PCBs management policies and statutes in China is divided into two stages. The first stage is the PCBs special management stage prior to 1995. Although the state puts up some pertinent managerial methods for PCBs management in this stage, a mass of information loss due to the backward of managerial means, deficient relevant laws and statutes and extensive alteration of institutions and personnel. Therefore, it is difficult to assess all-sidedly and objectively the executive effect of PCBs management at that time through systematic information. The symbol of the second stage is the issuance of the << Environmental Control Law of Solid Wastes Pollution of the People's Republic of China >> in 1995. After the law issued in 1995, the statute and standard systems of dangerous wastes were improved gradually and the management of hazardous wastes was improved further. However, the problem of polychlorinated biphenyl is an issue left over from history. As it is out of use or does not produce, its management discontinues. Although everybody discusses polychlorinated biphenyl, where the polychlorinated biphenyl is and how much the polychlorinated biphenyl is have been a big problem disturbing environmental regulatory agencies.

In addition, the management of polychlorinated biphenyl in China aims mainly at the management of polychlorinated biphenyl electrical installation. No managerial regulations are made for the polychlorinated biphenyl producing paint and printing ink.

## **4.2 RELEVANT EXECUTING AGENCIES OF PCBs MANAGEMENT IN CHINA**

Starting from the products' production and use, former Ministry of Chemical Industry is responsible for the production management of polychlorinated biphenyl raw material. Former Ministry of No.1 Machine- building Industry is responsible for

the production management of polychlorinated biphenyl power capacitors, General Administration of Customs of the P.R.C is responsible for the import management of polychlorinated biphenyl and its electrical installations, the State Ministry of Power Industry (presently the State General Company of Power Industry) is responsible for the operating management of polychlorinated biphenyl electrical installations.

China has presently stopped the production and import of polychlorinated biphenyl. Therefore, seeing from the source of producing polychlorinated biphenyl, the sources can be classified into three categories. The first category is the power companies, the second category is the enterprises having large-scale transforming facilities and the third category is the storage of capacitor factories.

The source of polychlorinated biphenyl electrical installations is mainly the power system. At present, the institutions and organizations of power system are as follows: power companies at provinces, autonomous regions and municipalities directly under the Central Government under the State General Company of Power Industry, various administrations of power supply at various cities under provincial power companies, various transformer stations under various administrations of power supply at various cities and large-sized enterprises' transformer stations from which the polychlorinated biphenyl electrical installations come. The State General Company of Power Industry sets up department of technology and environmental protection which is responsible for the environmental protection of national power system and is responsible for the management of polychlorinated biphenyl electrical installations. The departments of production or departments of security technology and environmental protection at provincial power companies, city administrations of power supply and large-sized enterprises are responsible for the management of their polychlorinated biphenyl electrical installations. Economic trade commissions at various levels are responsible for the management of large-sized enterprises and thus, bear the responsibility of management of PCBs electrical installations in large-sized enterprises.

Departments of environmental protection are responsible for the pollution control of polychlorinated biphenyl. The solid department of pollution control department of the State General Bureau of Environmental Protection is responsible for the national pollution control of polychlorinated biphenyl. The pollution departments of provincial bureau of environmental protection or provincial administrative center of solid wastes are responsible for the control of polychlorinated biphenyl pollution in their provinces.

The pollution control departments or administrative departments of city bureaus of environmental protections are responsible for the control of polychlorinated biphenyl pollution in their cities. The provincial bureaus of environmental protection are responsible for the transfer of polychlorinated biphenyl across provinces.

In addition, some scientific institutions in China develop some works in the establishment of environmental influence assessment and monitoring methods of polychlorinated biphenyl, research of management policies and standards, and the development of disposal techniques. Main units include Beijing University, Ecological Environment Center Chinese Academy of Sciences, Shenyang Institute of Environmental Sciences and Zhejiang Environmental Monitoring Central Station. China National Chemical Industries Association, China National Machinery Manufacture Association, national and local power reconnaissance design institutes will also play important role in the future investigation of polychlorinated biphenyl pollution sources.

Main scientific and monitoring institutions in PCBs field in China are as follows:

? Shenyang Institute of Environmental Sciences

Shenyang Institute of Environmental Sciences is under the jurisdiction of the State General Bureau of Environmental Protection and Shenyang Municipal Government, and meanwhile, is also the support unit of National Environmental Protection Technical Center of Hazardous Wastes Disposal Engineering. Such institute studied the techniques of PCBs incineration and disposal at the beginning of 1990s. It completes successively the development of PCBs incineration technology and the construction of incineration pilot plant, conducts the PCBs incineration treatment on a middle test scale and accumulates certain experiences in PCBs collection, transportation and disposal. At present, the institute is undertaking the construction of PCBs incineration demonstration engineering project that the State Planning Commission sets up. The National Environmental Protection Technical Center of Hazardous Wastes Disposal Engineering with the institute as its support unit is presently the unique domestic engineering technical center at national level in the field of hazardous wastes disposal. Its main responsibility is to develop the control technique of PCBs pollution with PCBs as its principal part and conduct engineering demonstration; to import, assimilate and assess foreign relevant techniques; to study and draft relevant economic and technical policies in the management of hazardous wastes.

### ? Zhejiang Environmental Monitoring Central Station

Zhejiang Environmental Monitoring Central Station is under the jurisdiction of Zhejiang Bureau of Environmental Protection. The station develops certain works in the monitoring of PCBs environmental pollution. It has the strongest capability in PCBs monitoring among provincial environmental monitoring central stations in China.

### ? Ecological Environment Center Chinese Academy of Sciences

The center is under the jurisdiction of Chinese Academy of Sciences. It is a scientific institution at national level that develops earliest PCBs scientific research in China. It has made many efforts in scientific research of PCBs. The center is also the draft unit of (GB13015-91) << Pollution Control Standards of Wastes Containing Polychlorinated Biphenyl >> in China.

### ? Shenyang Environmental Monitoring Central Station

Shenyang Environmental Monitoring Central Station is under the jurisdiction of Shenyang Bureau of Environmental Protection, and is one of domestic key monitoring stations in China. The station has also developed some works in PCBs monitoring and has possessed definite monitoring capability.

## 4.3 EXISTING PROBLEMS OF PCBs MANAGEMENT IN CHINA

- ? The management policies and statutes are not systematic, forming-a-complete-set and consecutive with bad forcible execution strength. The management policies and statutes issued by various national regulatory agencies, even issued by an administrative organization are mutually difficult to join. It is often the case that due to the alteration of administrative organization, after a management policy and statute issue, no successive enforcement regulations of management and methods are made, and the capability of management and execution fall short of a promise.
- Relevant policies and statutes in PCBs pollution control are not complete, lack particularly a variety of PCBs environmental quality control standards which make grassroot departments of environmental protection lack the basis of executing the laws and affect the PCBs management and supervision.
- The PCBs management in various regions in China is not balanced. Some regions

have managed PCBs for many years. The administrative departments in some regions even do not know what PCBs is. Departments of environmental protection at various levels lack professional managerial personnel and lack consciousness and mastery of knowledge in PCBs harm and relevant investigation, management and disposal which affects the executive effect of available management policies and statutes and are far away from the requirements of performance.

- With the deepening of system reform of Chinese government agencies, the PCBs regulatory agencies change much. Former Ministry of Chemical Industry, which was responsible for the production and management of polychlorinated biphenyl raw material, has been canceled. Former Ministry of No.1 Machine-Building Industry, which was responsible for the production and management of polychlorinated biphenyl power capacitors, has already been canceled and merged. The State Ministry of Power Industry that was responsible for the operation and management of polychlorinated biphenyl electrical installation becomes presently the State General Company of Power Industry which shall be divided into power generation company and power network company. Relevant personnel at the department of technology and environmental protection of former General Company of Power Industry shall enter entirely the power generation company, and the power network company shall be responsible for the operation and management of relevant electrical installations. Therefore, managerial personnel shall change much, which shall increase greatly the workload in training managerial personnel and bring also many difficulties to the performance activities in PCBs management, investigation, treatment and disposal.

## **5. PRELIMINARY ANALYSIS OF THE PREFERENTIAL FIELDS AND ACTIVITIES OF CATEGORY PCBs POPs CONVENTION**

As PCBs has stopped production for over thirties years in China and the problem of its substitute has already been solved, the problems of wastes cutdown and technical substitute do not exist during the implementation of <<Stockholm Convention>>. The problem of PCBs is an issue left over from history in China. The signature and performance of <<Stockholm Convention>> provide the best opportunity of solving this issue left over from history in new period. Although Chinese government has made unremitting efforts in PCBs management during past approximately thirty years, due to limited economic developing level, backward



management means, and influence of adjustment of industrial structure and change of economic operation model, the continuity of management is not achieved, which causes a mass of losses of management data and information and brings huge difficulties in solving thoroughly present PCBs problem. In view of the particularity of existence and management of polychlorinated biphenyl wastes, some special considerations should be made for developing activities in the NIP draft stage of PCBs section in China, particularly in preferential field.

### **5.1 EFFECTIVE EXECUTION AND CAPABILITY ENHANCEMENT OF AVAILABLE PCBs POLICIES, STATUTES AND STANDARDS IN CHINA**

Domestic PCBs management has passed nearly thirty years. Chinese economic development and establishment of regulatory agencies have changed greatly in past thirty years. Therefore, according to the variation of such progress, in draft NIP stage, we should review first the PCBs management history and assess the executive effect in various stages, determine domestic present situation of PCBs management and the disparity from requirements of performance and put up corresponding measures of capability strengthening, which is an important prerequisite and guarantee means for controlling and eliminating allsidedly and deeply the PCBs pollution.

### **5.2 INVESTIGATION OF PCBs DETAILED LIST IN CHINA**

At present, polychlorinated biphenyl not entering environment in China exists in two modes: warehoused old and useless PCBs electrical installations and on-line service PCBs electrical installations. The former is warehoused PCBs capacitors, and the latter is on-line service transformers. It is an important element task of drawing up and finishing NIP to develop the draft of investigation methodology of polychlorinated biphenyl storage and consumption, find out total storage quantity and the distribution of PCBs capacitors and the on-line consumption and service sites of PCBs transformers, ascertain the total import quantity and existing mode of domestic PCBs, and make a detailed list of domestic PCBs.

### **5.3 CONSTRUCTION OF PCBs MONITORING CAPABILITY IN CHINA**

Present levels of monitoring and analyzing polychlorinated biphenyl in China are

relatively backward. Available analysis standard of polychlorinated biphenyl was put up at the beginning of 1980s in the 20th century and is not revised for over twenty years. As compared with present general international standards and analytical methods, the qualitative and quantitative accuracy of such method is bad, and is difficult to accomplish the tasks of detailed list investigation, assessment of present pollution situation and technical assessment of pollution cutdown stipulated in convention. It is badly in need of establishing an analytical standard system conforming to international regulations.

#### **5.4 IDENTIFICATION AND RISK EVALUATION OF PCBs POLLUTION SITES IN CHINA**

Due to insufficient consciousness of the harm of polychlorinated biphenyl and managerial defect in past nearly forty years, PCBs production sites, service sites, and storage sites are polluted to a certain extent where some typical sites heavy polluted still diffuse PCBs into the environment. Therefore, the identification and risk evaluation of PCBs pollution sites in China are momentarily significant to the draft and implementation of NIP and the research of its methodology is also one of the important tasks in drawing up NIP stage.

#### **5.5 INVESTIGATION AND RESEARCH OF PCBs ENVIRONMENTAL POLLUTION STATUS AND INFLUENCE IN CHINA**

PCBs in China has long history of use and storage. However, the research on PCBs environmental pollution status and its influential degree is also very limited at present. Seeing from the tenet of the convention, the final goal of the convention is to control and reduce the pollution of POPs on environment, protect effectively the ecological environment, and reduce the influence and harm of POPs on environment and human health. Therefore, we should draw up as soon as possible domestic PCBs environmental quality standard, investigate domestic PCBs environmental background values, investigate and research the environmental pollution status and its influence in PCBs production, service and storage sites, particularly the systematic monitoring for food, biological sample, human milk and other tissue of human body, which is not only the important foundation of assessing the effective performance of convention but also a necessary task of developing deeply the activities of PCBs pollution control and final elimination.

## **5.6 DEVELOPMENT OF PCBs DISPOSAL TECHNOLOGY AND CONSTRUCTION OF PCBs PROCESSING CAPABILITY IN CHINA**

PCBs is an environmental issue left over from history. Final solution to PCBs is to destroy it thoroughly. Therefore, the development of domestic PCBs disposal technique and capability construction is a key task for China to execute the convention. In past ten years, China has conducted some fundamental researches and technical demonstrations on PCBs incineration disposal technique, conducted successively the development of incineration technology, the middle test of incineration system, and the construction of incineration demonstration project with processing scale of 15 tons per day. However, taking one with another, great gap exists between China and international advanced level in many aspects such as the central control of incineration system, on-line monitoring of incineration tail gas, characteristic identification and analysis of factory entry wastes and security emergency treatment. Definite difficulties also exist in performing the obligation of convention. In addition, China also lacks corresponding technical and equipment supports in PCBs collection, transportation and concentrative safety storage. Therefore, aiming at present situation of PCBs disposal techniques in China, improving and developing PCBs disposal techniques (including relevant collection, transportation, and safety and storage), and analyzing the demand of relevant disposal capability construction are also a activity of executing preferentially the convention.

## **5.7 PROPAGANDA AND PUBLIC PARTICIPATION OF ELIMINATING PCBs IN CHINA**

The PCBs pollution control and elimination in China will firstly involve with owners of PCBs storage sites and direct pertinent persons in regulatory agencies, involve with a number of relevant parties in PCBs storage sites and their circumferences, and also involve with extensive masses affected directly or indirectly. Therefore, conducting propaganda and education of PCBs pollution control policies and actions, raising the consciousness of general public for PCBs, and strengthening public's obligation and sense of responsibility in executing the POPs convention should be considered as the important preferential actions during the performance process.

## **5.8 STRATEGIC SELECTION OF ELIMINATING PCBs IN CHINA**

The convention puts up the total strategy of cutting down and eliminating PCBs. Various countries prepare their concrete procedures and measures according to their concrete situations in present PCBs management situation, relevant technical level, and economic bearing capability. Therefore, based on above research achievements, considering domestic practical situation, the working-out of concrete strategies and action plan eliminating PCBs pollution in China is an important component part for China to execute the convention.

**Appendix 3: Primary assessment report on unintentional by-products  
in China**

**Appendix 3:  
PRIMARY ASSESSMENT REPORT ON  
UNINTENTIONAL BY-PRODUCTS IN CHINA**

**Unedited draft English text of final report in Chinese**

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## **1. Preface**

On May 23, 2001, China subscribed the Stockholm Convention on Persistent Organic Pollutants, which requires each party to develop a National Implementation Plan within 2 years from the date of its entry into force. For China is a developing country that has a far-flung terrain, a large population and a lopsided regional development, the antecedent preparative work must be carried out before the NIP is made.

The unintentional by-products are the most difficult to control and the sources of them are the most complex in the prescriptive 12 kinds of POPs. Presently in China we have no ability of monitoring the unintentional by-products and don't understand the exact pollutant sources and the pollutant conditions. But we can forecast the unintentional by-products exist widely in our country especially in the chemical production of chloric alkali and chlorophenol, papermaking, waste incineration and metallurgy technical processes.

This project is a part of PDF-B, the work contents mainly conclude: identifying preliminarily the unintentional by-products existing potentially in China; investigating and estimating preliminarily the supervisory capability of by-products in China; and ascertaining the operable demand and expenses plan for the NIP.

The convention lists 4 unintentional POPs: PCD, PCDF, HCB and PCBs. For PCBs and HCB are still the intentional chemical products in China, the by-products part of the PDF-B project mainly centers on the dioxin and the furan.

## **2. Preliminary identification for the releasing sources of dioxin existing potentially in China**

Of the 17 possible industrial sources of the dioxin listed in Annex C of the convention, almost all of them exist in China. There are many industries relating to the dioxin in China, but few investigations about the pollutant sources and pollutant conditions of the PCDD/PCDF was carried out. Though some scientific research institutes have ever analyzed and tested the contents of the dioxin in some chemical products and the emission wastes, the emission factors of these industries can't be estimated by the testing results because the testing samples are so little. However,

from the testing results we can see there are many emission sources of dioxin in China, furthermore some technical levels of China are lower than that of the foreign countries and the emission factors are probably different from that of the foreign countries.

This project preliminarily investigates the 17 possible industrial sources of the dioxin listed in the affix C and the production conditions investigated by the UNEP standardized toolkit. From the investigation, we can see there are many differences between China and the foreign countries in the industrial raw materials, the technical processes and the pollution control levels. Therefore, whether the emission factors in the standardized toolkit can be used in China must be validated through experiments. The identification of the PCDD/PCDF pollutant sources and the confirmation of the emission factors will be a very herculean task.

The preliminary identification of the PCDD/PCDF pollutant sources in China is simply introduced in the following. The detailed contents are in the original identification reports as the affix.

## 2.1 Metallurgical Industry

China is rich in steel. The steel output of China has been standing the first place in the world for 6 years. By the end of 2000, the number of the steel industry is 2997, of which 13 enterprises can produce 550-990 thousand tons steel a year and 37 enterprises can produce 1 million tons steel in a year (of which 3 enterprises can produce 5 million tons steel a year). The main products yields of the steel industries in 2000 are listed in Table 2-1.

Table 2-1 Output of Major Products of Iron and Steel Industry in the Year 2000  
in China

Product	Unit	Output
Iron ore(Crude)	10 thousand tons	22256.19
Coke	10 thousand tons	12184.12
Pig iron	10 thousand tons	13101.48
Crude steel	10 thousand tons	12850.00

Now the process engineering and technical arrangements of the steel industry in China are more advanced than that of the past. But comparing with the advanced countries, some problems still exist in China, for example, both the advanced process engineering and the outofdata process engineering exist at the same time. Especially in



the pollution control technology and equipment, China has very large gap with the advanced countries. Presently the large-medium industries of China has controlled the sulfur dioxide and reached the standard of the dust emission, but almost no measures of controlling the emission of the PCDD/PCDF are carried out and the pollution conditions of the small enterprises are very terrible.

The actual instance of the dioxin emission in China can't be predicted because of the lack of the monitoring datum. In addition, because the steel output of China is so large and the levels of the production process and the pollution control are all different, so directly using the datum in the UNEP standardized toolkit may lead to errors. Therefore, the emission factors of the dioxin in the still industries of China must be calculated correctly so that the listing can be made exactly and the actual evaluation of the emission status of the PCDD/PCDF in the steel industries of China can be done.

Presently there are 5,000 non-ferrous metal regenerative factories with different scales in China. The yearly output of the regenerative non-ferrous metal occupies 25-30 percent of the yearly output of all the non-ferrous metal. However, the technical arrangements and the environmental facilities of China are more outdate than that of the advanced countries and with the development of the non-ferrous metal regenerative industry attention must be paid to the pollution of the PCDD/PCDF by-products. The main products yields of the non-ferrous metal industries in 2000 are listed in Table 2-2.

Table 2-2 Output of Non-ferrous Metals in the Year 2000 in China

Product	Output (Unit: Ton)		
	Total	Mine output	Recovered metals
Copper	1,371,132	1,023,427	347,705
Aluminium	2,989,246	2,794,068	145,178
Lead	1,099,895	997,904	101,991
Zinc	1,956,997	1,887,233	69,764
Magnesium	142,096	141,835	---
Other Non-ferrous metals	278,695	276,397	2,177

## **2.2 Waste Incineration**

### 2.2.1 Municipal Solid Waste Incineration

In the later 1990s, some big cities and coastal cities of China began to dispose the municipal solid waste in the method of incineration in succession. According to the undercount there are more than 40 municipal solid waste incineration plants in China, the daily capacity of which exceed 132,000 tons, the furnace types of which are mainly the fluidized-bed and the furnace with every kinds of fire grates, and whose subsequent disposal equipments mainly include the electrostatic precipitation, the semidry process with the fabric filter and the semidry process with the active carbon and the fabric filter.

### 2.2.2 Hazardous Waste Incineration

In 2000 there were 8,303 thousand tons hazardous waste in all the industrial waste in China, of which 1,790 thousand tons were disposed, parts of which were disposed by the incineration method, the incineration status need to be further investigated.

In the later 1990s, the Chinese began to study incinerating the hazardous waste with the cement rotary kiln. The Peking cement plant has had the ability to dispose the hazardous waste with the cement rotary kiln. The plant used the bag type collector at the end of the kiln and the effect is very good since it operates in April 1995. The bag type collector can dispose 370 thousand cubic metres fume per hour; the dust collecting efficiency is very high and the emission concentration is only several milligram flue dusts per cubic metre fume. A research institute has tested the PCDD/PCDF in the fume and the results indicated the PCDD/PCDF content was 0.08-0.2 ng TEQ/m<sup>3</sup>.

The incineration of the medical waste in China waits to be further investigated.

### 2.2.3 Crematoria

The PCDD/PCDF sources in the crematoria of China are the cremations furnace and the incineration of the reliques.

According to the undercount, there were 5,462 cremation furnaces in 2000 in China and 3,736,540 reliques were cremated. In present, the fuel of the cremation furnace is the diesoline and most cremation furnaces have no subsequent disposal equipments; there are not any disposal equipments and the relique is incinerated completely in the open air.

With the rapid speed of the urbanization, the cremation of the relique becomes the inevitable trend so that attention should be attached to this kind of PCDD/PCDF source.

### 2.3 Pulp and Paper Mills

China is not only the pulp production country, but also the pulp importation country. In 2001, there were 4,000 paper and cardboard productive enterprises in the papermaking industry of China. The productive output of the paper and the cardboard was about 32,000 thousand tons; the import volume of every kinds of paper and cardboard is 5,590 thousand tons; the export volume of them is 760 thousand tons; the overall consumption is 36,830 thousand tons and the consumption per head is 29 kilogram.

Among the pulp fibrous materials, lumber is very small and the grass is very large. So China is the largest pulp production country in the world.

The chlorine blanch of pulp can produce the PCDD/PCDF. Because the raw materials of the paper making, the blanch processes and the chemical medicine it uses (e.g defoamer agent) are different from that of the foreign countries, whether the PCDD/PCDF productive principal and its emission factor adapt to China need to be validated.

The data of the raw material for papermaking in 1980, 1985, 1990 and 1995 are listed in table 2-3.

Table 2-3. Papermaking raw material makeup during 1980-1995 in China

Unit: 10,000 tons								
Items	1980		1985		1990		1995	
Consumption of Paper and Paperboard	590		960		1400		2600	
Total Production of Paper and Paperboard	534.6		911.1		1371.8		2400	
Pulp consumption for producing one ton paper(unit: kg)	1018		957		1015		930	
Total pulp consumption per year	544.2		861.9		1393.25		2232	
Including: indigenous pulp	519.2		808.9		1339.25		2150	
	Raw Material	Pulp	Raw Material	Pulp	Raw Material	Pulp	Raw Material	Pulp
1. Wood pulp		135		187		203.74		290

Including: indigenous pulp	445	110	536	134	673	149.79	936	208
Imported pulp	25	25	53	53	54	54	82	82
2. Reed pulp	131	52.4	182.4	73.4	214	85.67	238	95
3. Bamboo pulp	22	8.6	27	10.8	39	15.49	88	35
4. Bagasse pulp	45	18	66	24.5	64	25.58	138	55
5. Grass pulp	495	199	789.2	310	1505	602.11	2232	893
6. Cotton, hemp, rag pulp	46	36.6	66	52.3	56	44.23	63	50
7. Waste paper pulp	102	81.6	200	172.4	490	392.4	950	760
Including: imported waste paper			3.5	3	26.5	21.2	91	73
8. Other pulp	16	13	31	25.5	29	24.03	65	54

In recent years, the composition of raw materials varies little. The latest status of papermaking industry of China is listed below.

Table 2-4 Pulp makeup of papermaking industry in 2000

Classification	Consumption (1,000 ton)	Proportion (%)
1. Wood pulp	4820	18.4
Including: indigenous pulp	3320	12.7
Imported pulp	1500	5.7
2. Reed pulp	1260	4.8
3. Bamboo pulp	470	1.8
4. Bagasse pulp	920	3.5
5. Grass pulp	7400	28.3
6. Cotton, hemp, rag pulp	1000	3.8
7. Waste paper pulp	10290	39.3
Total	26160	100

Table 2-5 Consumption of fiber raw materials in papermaking industry in 2000

Classification	Consumption
Wood	15,000 cubic kilometers
Reed	3,150 kilotons
Bagasse	2,300 kilotons
Bamboo	1,170 kilotons
Rice straws	18,500 kilotons
Cotton and hemp	1,500 kilotons
Waste paper	12,860 kilotons
Total	51,720 kilotons

## 2.4 Chemical Industry

### 2.4.1 Chlorophenol Production

The main products of the chlorophenol are the pentachlorophenol and sodium pentachlorophenate (PCP and PCP-Na) and the main productive plant of them is the Tientsin Dagu chemical plant of the Tientsin Pohai chemical Ltd. and the productive outputs of other plants are very small relatively. Tientsin Dagu chemical plant had been producing PCP and PCP-Na from 1959 to 2000 for 31 years. The productive outputs of the PCP-Na in the past 40 years of China<sup>[7]</sup> are listed in the Figure 2-1.

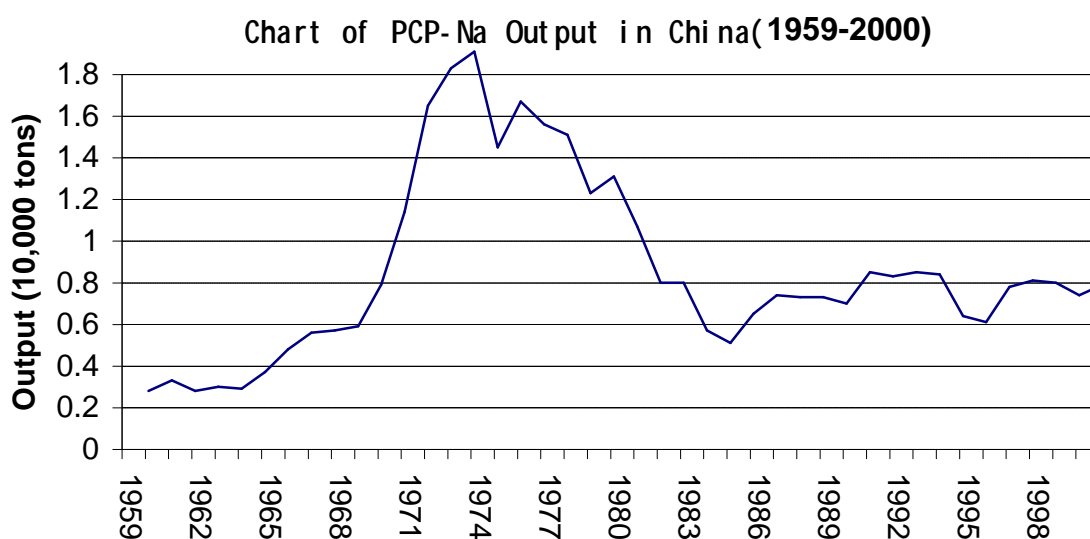


Figure 2-1 Production of PCP-Na in China

Some researchers had ever analyzed and tested the PCDD/PCDF contents in the PCP and PCP-Na<sup>[8]</sup> and the results are listed in Table 2-6.

Table 2-6 Contents of PCDD/F<sub>s</sub> in some samples (UNIT:μG/KG)

PCDD	PCP	PCP-Na	PCDF	PCP	PCP-Na
2,3,7,8- T <sub>4</sub> CDD	14.1	4.0	2,3,7,8- T <sub>4</sub> CDF	3.0	3.1
1,2,3,7,8- P <sub>5</sub> CDD	2.2	2.1	1,2,3,7,8- P <sub>5</sub> CDF	12.9	40.9
			2,3,4,7,8- P <sub>5</sub> CDF	3.8	2.4
1,2,3,4,7,8- H <sub>6</sub> CDD	351	244	1,2,3,4,7,8- H <sub>6</sub> CDF	97.7	76.1
1,2,3,6,7,8- H <sub>6</sub> CDD	ND	13.8	1,2,3,6,7,8- H <sub>6</sub> CDF	13.7	9.4
1,2,3,7,8,9- H <sub>6</sub> CDD	3.5	2.1	1,2,3,7,8,9- H <sub>6</sub> CDF	0.1	0.32
			2,3,4,6,7,8- H <sub>6</sub> CDF	1.3	0.93
1,2,3,4,6,7,8- H <sub>7</sub> CDD	2473	1702	1,2,3,4,6,7,8- H <sub>7</sub> CDF	240	135
			1,2,3,4,7,8,9- H <sub>7</sub> CDF	29.6	18.3

OCDD	22026	12514	OCDF	3674	1647
Total PCDD <sub>s</sub>	25470	15760	Total PCDF <sub>s</sub>	4740	2260
Total I-TEQ	142	92			

#### 2.4.2 Chloranil Production

Because of the production process the *p*-chloranil may contain high concentration of the PCDD/PCDF. But the public enunciable datum of the chloranil output is not complete. In 1997, the Haihui chemical Ltd. in Hebei Zhuozhou and the Jinteng chemical Ltd. in Zhejiang Ningbo were the two main chloranil productive plants; the yearly outputs of them are 500 tons and 300 tons respectively. Some researchers also found the PCDD/PCDF in the chloranil product of China and the PCDD/PCDF content of the industrial grade chloranil is 5.4 ng TEQ/g<sup>[9]</sup>.

#### 2.4.3 Chlorine Production

Chlorine gas is produced by passing an electric current through brines. Essential co-products are caustic soda (sodium hydroxide, NaOH) and hydrogen (H<sub>2</sub>). There are three principal industrial processes used; the mercury, diaphragm, and membrane cell processes. The UNEP Standardized Toolkit indicates that PCDF can be formed in the chlorine cells; concentrations of PCDD are very low. The formation of PCDD and PCDF occurs particularly when graphite anodes are used and there has been a progressive replacement of such anodes in industrialized countries since the 1970s. Some datum also indicated that PCDF can be produced using the titanium anode process; in this case, the source of the organic carbon may be the rubber sealing rings used in the cells.

China has a large and important chlor-alkali industry and ranks second in the world in terms of production with an annual output in 1998 of 5,080 thousand tonnes. Of an estimated 500 chlor-alkali enterprises in the world, 200 are in China. Graphite anodes were commonly used in China's chlor-alkali industry. In those enterprises where this process is used, it is being progressively replaced by metallic channel technology. Chlorine output via the graphite anode process is now thought to be very small representing only about 3% of total production. With the technical innovation now being carried out in the caustic soda industry of China all the graphite anode cell processes will soon be replaced. The present technical innovation and the technical status wait to be investigated in detail.

#### 2.4.4 Crematoria

The UNEP Standardized Toolkit indicates that cremation, the practice of destroying human bodies by burning, can result in the formation of PCDD/PCDF and may have significant impacts as most crematoria are located closed to residential areas and have only relatively low emission stacks.

There were 5,462 cremation furnaces operating in China in 2000 and a total of 3,736,540 corpses were cremated. At present, the fuel of the cremation furnace is diesoline and most cremation furnaces have no pollution control equipment; there is not disposal equipment and remains are incinerated completely in the open air. With the rapid speed of urbanization, the cremation of human remains is likely to become the increasing trend so that attention should be attached to this kind of PCDD/PCDF source.

## 2.5 Other Possible PCDD/PCDF Sources

There are many other PCDD/PCDF sources in the POPs convention; but no PCDD/PCDF tests on these potential sources were implemented yet.

### 2.5.1 Mineral Products

The kind of pollution sources includes cement production, lime production, glass production, ceramics production and so on; they all belong to the structural materials industry. All the products need to be processed with high temperature in the industrial kiln. The production output of the structural materials of China is very large and the above several products all stand the first place in the world presently.

Table 2-7 Output of Mineral Products in 2001 in China

Product	Unit	Output
Cement	10 thousand tons	62,090
Lime	10 thousand tons	6,846
Brick	10 thousand pieces	11,393,520
tile	10 thousand pieces	946,144
Glass	10 thousand weight boxes	20,364

White ware	ton	445,690
Enamelled brick	10 <sup>4</sup> m <sup>2</sup>	67,234
Wall and floor tile	10 <sup>4</sup> m <sup>2</sup>	113,809

There are more than 200 thousand structural materials production enterprises with small scales; a few enterprises still rest on the indigenous method and the handcraft workshop; so the general level of the structural materials production is much low; the quality of the products is much bad; the consumption of the energy is much high; the pollution is much severe; and the pollution harness technology and equipment is also out of date and so on.

### 2.5.2 Power Generation and Heating

In China, power generation, heating, warming and cooking mainly depend on the fossil fuel (coal, petroleum and natural gas) and at the same time coal is the most widely used of the three. In 2000, the consumptions of the main fuels are listed in Table 2-8.

Table 2-8 Consumption of the main fuels in china<sup>[11]</sup>

Energy variety	Power generation consumption	Heating consumption	Living consumption ( 1999 ? )
Coal consumption ( 10 thousand tons)	52810.45	6382.3	8404.42
Fuel oil consumption( 10 thousand tons)	1041.56	175.6	—
Natural gas consumption ( a hundred million m <sup>3</sup> )	1538163	873543	25.72

### 2.5.3 Transports

In 1999, the sales volume of the two stroke motorcycle and the four stroke motorcycle are 3,103,521 and 8,067,984 respectively; the sales volume of the diesel oil vehicle is 536,507 and the diesel oil consumption is 22,216.5 thousand tons occupying 35.65 percents of the overall diesel oil consumptions in China; the sales volume of the gasoline vehicle is 1,296,469 and the gasoline consumption is 12,666.2 thousand tons occupying 37.43 percents of the overall gasoline consumptions in China.<sup>[12]</sup>

### 2.5.4 Leather, Spin and Dye Printing Industries



In 1998, the total industrial output value of the 596 tan enterprises reached 23,200 million Yuan, the 1,022 shoes enterprises 4,770 million Yuan, the 376 leather enterprises 1,048.9 million Yuan, the 132 luggage enterprises 325.7 million Yuan, the 241 fur and laminated plastics enterprises 563 million Yuan and the other 249 enterprises 587.6 million Yuan in China<sup>[13]</sup>.

The spin industries include every company and enterprise relating to production or process of the dry goods, for example, fiber, yarn, fabric and so on. In 1999, the output of the chemical fibre was 6,020.4 thousand tons, the yarn 31,746.9 thousand pieces, the yarn 5,704.8 thousand tons, the cloth 25,000 million meter, the pure cotton cloth 11,846 million meter, the cotton blending interlaced cloth 8,030 million meter, the pure chemical fibre cloth 5,124 million meter, the cotten-dacron textile blending cloth 6,667 million meter, dye printing cloth 16,045 million meter, the reduced yarn from the pin cotton textiles 4,832.6 thousand pieces, the wool 396.1 thousand tons and the woolen cloth 2,754,800 million meter.<sup>[14]</sup>

## **2.6 Hot Spots**

### 2.6.1 Wastes of the Chloric Alkali Chemical Industry

In some chloric alkali chemical industry, the concentration of the PCDD/PCDF wastes is very high, for example, the electrolyzed lead residue; also most of the wastes are not disposed safely and become a kind of potential hidden trouble.

The « National Lists of Hazardous Waste(Env1998)» of China prescribes the wastes containing the polystream furan (HW43) or the polystream PCDD/PCDF (HW44) belong to the hazardous waste and they must be disposed according to the prescription of the hazardous wastes. However, this kind of waste in most factories are only banked up or simply landfilled because of the lack of fund and technic.

### 2.6.2 Territories of Using PCP

PCP-Na has been used in China to perish the oncomelania to prevent the schistosomiasis for more than 40 years. Because the schistosomiasis has ever been the rage in more than 10 provinces and municipalities of China, so the PCP-Na was used as the medicine in 11 provinces and municipalities of middle and lower reaches of Changjiang river; the areas where the PCP-Na was used reached more than 14,800 million square meters. Just because the PCP-Na has been used for a long time, the PCDD/PCDF in the PCP-Na has been enriched in these areas and the environment of these areas has also been polluted to some extents.

### 2.6.3 Contingencies

Fire is the main contingency that can lead to the PCDD/PCDF pollution and the emission factors of the chemical products fires and the raw materials fire are always very high. But there are no reports about stabilizing the hangovers of fires. Inspecting the PCDD/PCDF of the hangovers of all kinds of fires especially the chemical fires and disposing properly these hangovers in China are very necessary.

## **3. General Situations of Management Policies and Executing Agencies of China for the Unintentional By-products**

### **3.1 Actuality of Management Policy for the Unintentional By-products**

In the existing « Environmental Protection Law of China », « Environmental Pollution Control Law for Solid Waste of China », « Water Pollution Control Law of China » and « Atmosphere Pollution Control Law of China », there are correlative articles to control the pollution of the unintentional PCDD/PCDF by-products.

However, in China the concrete implement of the law need correlative specific bylaws to support. To control the pollutants, the correlative supervision and administration measures such as the national or regional environmental quality standards, pollutant drainage standards, monitoring systems, monitoring criterions and monitoring webs must be relied on and established.

Presently, in China the acquaintance of PCDD/PCDF in POPs is still at the beginning phase and the emission control of it is not arranged in the schedule. Therefore, the policies and bylaws about the PCDD/PCDF pollutants emissions are nearly blank and the scanty policies relating to the PCDD/PCDF by-products are listed as follows:

- « Directory of Hazardous Wastes of China (Env. 1998) »

It was enacted by the National Environmental Office, the National Trade Committee, the Foreign Trade Board and the Ministry of Public Security on Jan 4 1998 and brought into effect on July 1, 1998. The polystream furan and polystream dioxin are also in the directory. All the hazardous wastes in the directory will be supervised according to the rules of « Environmental Pollution Control Law for Solid Waste of China » .

However, in the present this kind of waste in most factories are only banked up or simply landfilled because of the lack of fund, technic and correlative by-laws and supervisory means of the kind of hazardous wastes.

Presently, there are 2 emission standards and 1 testing method standard to supervise the emission of the PCDD/PCDF pollutants. The specific contents are as follows:

- Pollution Control Standard for Hazardous Wastes Incineration (GB 18484-2001) (Replacing GWKB2-1999)

The standard was released on Nov 12, 2001, which lists: the technical indicators for the incinerator of the hazardous wastes and the emission limit of the PCDD/PCDF ( $0.5\text{TEQng/m}^3$ ).

- Pollution Control Standard for the Municipal Solid Waste Incineration (GB 18485-2001)

This standard was released on Nov 12, 2001, which indicates the technical indicators for the incinerator of the municipal solid wastes and the emission limit of the PCDD/PCDF ( $1.0\text{TEQng/m}^3$ ).

- Tests of the Polystream furan and Polystream dioxin: Isotope Dilution High Resolution Capillary Gas Chromatography/High Resolution Mass Spectrometry (HJ/T 77-2001)

The method was released on Oct 19, 2001 and brought into effect on Jan 1, 2002. The standard combined the isotope dilution and high resolution capillary gas chromatography (HRGC) /high resolution mass spectrometry (HRMS) coupling technique; it can test 2,3,7,8-chloric and 4-8 chloric dioxin and furan in the liquid, solid, gas state and biological organization. This method refers to the international universal EPA1613 standardized analysis method of dioxin which provides 17 kinds of PCDD/PCDF and their minimum limits.

In addition, there are no national or regional correlative environmental quality standards and emission standards relating to the by-products; and there are also no contents limitation standards relating to the products containing the by-products (such as pesticide, foodstuff and feed additive). For the PCDD/PCDF by-products with complex pollutant sources, there are large gaps in the standard establishment.

Because the monitor techniques, facilities, staff, the administrative level and the

short of the fund, in the present there are no monitor abilities in the existing webs; so for the above the incinerators there are no qualified powerful supervisory abilities and the implementation plan is not carried out yet.

### **3.2 Actualities of Executing Agency of China for the Unintentional By-products**

The unintentional by-products are let out to the environment mainly with the waste gas, the wastewater and the waste residue of every industry, so the direct agencies supervising the pollution control of the by-products are as follows:

- National Environmental Protection Agency and Regional Environmental Protection Agencies

National or Regional Environmental Protection Agencies mainly supervise the pollutants emissions of every industries, manage the hazardous wastes, draw out the pollution control policies, rules, regulations and standards and execute them. Because the supervision for the by-products is at the beginning and the monitor abilities support is lack, the work on the policies, rules, regulations and standards relating to controlling the PCDD/PCDF pollutants emission are still very limit.

- National Quality Supervision and Verification Agency

The agency mainly manages the import and export commodity inspection, the commodity quality standard and the lab authentication. Presently there are no works coming down to the PCDD/PCDF by-products.

However, because the unintentional by-products are from many industries, in the present of China, taking the PCDD/PCDF emission standard as the supervisory method simply is very unpractical for it may involve many industries' economic benefits. On the control of the PCDD/PCDF by-products, one lies in the final harnessing and the more important lies in the innovation of the production process and the refresh of the raw materials and the products so that the "cleaner production" can be used to control the by-products by and by and eliminate them finally. This is a far-flung progress combining controlling the pollution and protecting the enterprise benefits. So under the situation of China and the progress of controlling the pollution, the production control division of enterprise including the ministerial control agency and the guild will hold the balance; and in establishing and executing the related policies and rules, the following sections proposed by the environmental agencies may also hold the balance:

- National Trade Committee

It mainly supervises the chloric chemical industry, paper making industry, metallurgy industry, manufacture of building materials industry, weave industry, leather industry and petroleum industry; it also plays an important role in establishing the industrial policies and pushing the sanitary process.

- Board of Agriculture

The unintentional by-products mainly exist in the impurity form of the pesticide, the animal medicine, the feed additive and the farm products, so the board of agriculture will supervise these products.

- Board of Construction

It mainly clears and transports the domestic wastes, constructs and manages the solid wastes and the municipal wastewater disposal plants.

- Board of Civil Administration

It mainly supervises the funeral and interment enterprise including the layout, construction and operation of the crematory.

- Board of Sanitation

It mainly takes charge of supervising the national occupational health, the national environmental health, the infectious disease control and national food sanitation and establishing, examining and approving the national quality supervision criterions relating to the health.

There are also other correlative supervisory agencies and associations including the iron and steel industrial association of China, the non-ferrous metal industrial association of China, the building materials industrial association of China, the petrochemical industrial association of China, the chloric alkali industrial association of China, the textile industrial association of China, the paper-making industrial association of China and the leather industrial association of China and so on. The associations help the enterprises to implement the policies and rules enacted by the governor and transfer the information between the governor and the enterprises. In the present, they have little acquaintance on the unintentional by-products and so no work is done in the propaganda and control of the by-products.

To control the unintentional by-products, the construction of the monitoring ability is the base task and it is also the very feeble facet in the field of the by-products of China. Now the existing monitoring webs, agencies and labs are as follows:

- Taking the national environmental monitoring station as the centre, there are 1979 environmental monitoring centre stations, but they have no the PCDD/PCDF monitor ability.

- The center of forecasting and analysis of the national environmental protection agency is entrusted to take on the PCDD/PCDF monitor tasks of incinerator in China. The centre has possessed completely the sampling and pretreatment abilities. Presently the centre cooperating with the PCDD/PCDF analysis lab of Peking university is developing the PCDD/PCDF analysis; the centre mainly dose the sampling and pretreatment work and the PCDD/PCDF analysis lab of Peking university mainly does the analysis work using the high-resolution mass spectrometer (HRMC).

- Presently there are several PCDD/PCDF inspecting labs possessing the high-resolution mass spectrometer (HRMC), for example, the first PCDD/PCDF analysis lab in Wuhan hydrophytic institute of the Chinese Academy of Sciences built in 1997, the PCDD/PCDF analysis labs of the center of disease control (CDC) of Peking university, the CDC of Shenzhen, the CDC of Shanghai, the ecological and environmental research center of the Chinese Academy of Sciences and the chemicophysical research institute of the Chinese Academy of Sciences built after 1999 successively. The detecting methods include the HRGC/HRMS, the HRGC/LRMS, the HRGC/MS/MS and the biological detecting and so on.

In the present, all the above labs possess a high-resolution mass spectrometer (HRMC) and the basic analysis can be done in these labs. But the ubiquitous problems are: the faulty supporting facilities, the severely short of research and detecting personnel resource (The detecting abilities of the labs always depend on one or several persons.), the undound administrant system of the quality control and assuring and the large gap with the international level. Though they all have the detecting and researching experiences, no lab has ever done the check experiments of the international authentication.

There are also some sections entrusted by the government departments or authorized according to the relating laws and rules that execute the managing function about the by-products or provide technical supports in the managing by-products by the government departments. Presently, the main administrant and supporting sections are

as follows:

- Register Centre of the Chemical Articles of the National Environmental Protection Agency

As the technical supporting unit of the chemical articles management of the National Environmental Protection Agency, its main tasks are: studying and improving the method and technology of the chemical articles environmental managing in China, participating in drawing out the partial policies, rules and standards relating to the chemical articles managing and providing the technical support for the administrative decision-making. Presently the following works have been carried out: providing the technical support for the negotiation of the POPs convention, participating in the antecedent preparative work of the agreement part, organizing, harmonizing or leading to investigate the basic instance of China.

- The correlative universities and scientific research institutes: Peking university, ecological and environmental centre of the Chinese academy of sciences and Tsinghua university and so on. These units have carried out some research works about the PCDD/PCDF by-products and have possessed some bases and experiences. They can provide the scientific theories and the special technical support for the establishment of the national policies and schemes.

For the new problem of the by-products, the standby technology, the research ability of the by-products generating mechanism, the research ability of the biological and environmental testing technology, the ability of the hazard appraisal and the forward looking research ability are all very poor.

#### **4. Challenges in Establishing the National Implementation Plan for the By-products in China**

For unintentionally produced persistent organic pollutants from anthropogenic sources listed in Stockholm Convention, Each Party shall develop an action plan or, where appropriate, a regional or subregional action plan within two years of the date of entry into force of this Convention, designed to identify, characterize and address the release of the chemicals listed in Annex C. The action plan shall include the following elements: An evaluation of current and projected releases, including the

development and maintenance of source inventories and release estimates; An evaluation of the efficacy of the laws and policies of the Party relating to the management of such releases; Strategies to meet the obligations; Steps to promote education and training with regard to, and awareness of, those strategies; And the strategies and success in meeting the obligations shall be reviewed every five years. In addition, promote and require the use of best available techniques for new sources within source categories which a Party has identified as warranting such action in its action plan. In any case, the requirement to use best available techniques for new sources in the categories listed in Part II of that Annex shall be phased in as soon as practicable but no later than four years after the entry into force of the Convention for that Party. Promote the use of best available techniques and best environmental practices for existing sources, within the source categories listed in Part II of Annex C and within source categories such as those in Part III of that Annex, and so on.

According to the above Convention requirements and present situation in China, tasks on reduction and elimination of unintentionally produced POPs will include: sources identification; monitoring/analysis capabilities strengthening; inventory development; capacity building and strengthening for the administration of the Convention implementation; technology assessment on controlling unintentionally produced POPs; case and pilot study of controlling technology; sector strategy and plan on reduction and elimination of unintentionally produced POPs.

According to the Convention requirements, the first step of Convention implementation is the NIP formulation. According to the guidance of NIP formulation from UNEP, the contents of NIP shall include:

Inventory on releases from unintentional production of PCDDs/PCDFs in China.

The action plan on releases from unintentional production of PCDDs/PCDFs. 1. Objectives and priorities of action plan; 2. Current and projected releases of PCDDs/PCDFs; 3. Environmental and health risks related to the substances; 4. Measures for reduction of PCDDs/PCDFs; 5. Public information and awareness; 6. Investment projects; 7. Implementation of the action plan; 8. Costs and financing of action plan implementation.

Through preliminary survey on potential PCDDs/PCDFs sources and administration capacity in China and according to the requirements of the NIP guidance, challenges faced with China for Convention implementation of unintentionally produced POPs include the following.



#### **4.1 Challenges in investigating inventory**

Establishing the inventory is the base to carry out the controlling activities. The detailed emission sorts have been listed in Annex C of the convention that explains every kinds of the emission source in detail. Almost all the sources listed in the Annex C all exist in China and among them the steel industry, the chemical industry and the power generation industry of China stand first in the world; in addition, the particular hotspot areas exist in China such as the production of the PCP-Na. So the control of the unintentional by-products becomes the important and difficult matter in the convention, the depth and the width of which will both exceed that of the PCBs and the POPs.

The emission of the PCDD/PCDF by-products is tied up with the adoptive technical conditions. Because the general technical level has large gaps with the advanced countries, adopting the emission factors of the advanced countries to calculate the emission of the PCDD/PCDF by-products may lead to very large deviation so that the parameters provided by the UNEP Standardized Toolkit are confined in China.

The PCDD/PCDF monitoring and researching abilities are just at the beginning and only very few colleges and institutes possess the abilities to analyze the PCDD/PCDF; but all the labs have large gaps with the international level and no labs have ever done the check experiments of the international authentication. However, the national functional monitoring departments are always lack of the abilities to monitor the POPs of the dioxin and the furan. Most of all the specialized technical personnel of the lab are very short and the personnel flow and the apparatus faults both can affect the testing ability of the lab. In addition, because the testing fund is lack, the national and large scale regional environmental pollution investigations and the pollution source identifications have not ever been carried out and then they have no the relating work experiences.

As the large developing country, China is walking up to the industrialization and it has the outdated industrial process level and the lack pollution control ability. The PCDD/PCDF by-products pollution of China can't be undervalued. Because the present analyzing and monitoring conditions can't meet the demands of the convention and establishing the NIP, the check on the emission sources and the evaluation of the emission amount will both be difficult and complex.

It can be predicted setting up the PCDD/PCDF monitoring and analyzing abilities

and the PCDD/PCDF emission inventory is a far-flung and expensive process. According to the demand of the convention, taking different policies and methods and carrying out the investigation about the PCDD/PCDF in the different periods are necessary in China.

#### **4.2 Challenges in the supervisory ability to control the by-products**

The supervisions on the PCDD/PCDF are just at the beginning and the correlative rules are very few. At the same time, the detection of the PCDD/PCDF needs high levels and large expenses, which decide the technical conditions to implementing the supervisions are far inadequate even to the present standards. The reduction and control of the PCDD/PCDF involves lots of enterprises and departments. To reduce and control the by-products effectively, the correlative policies and rules must be established on the present supervisory bases.

It is predicted preliminarily the PCDD/PCDF supervision will involve the Environmental Protection Agency, the Sanitary Agency, the Trade Committee and the Quality Supervision and Verification Agency and so on. Though the Environmental Protection Agency has the main responsibility to supervise the PCDD/PCDF pollution control, the establishment of the correlative policies and rules need the effective collaborations with the other relating boards. In addition, the by-products involve many miscellaneous industries and departments, the supervision of the National Environmental Protection Agency need to be enhanced to establish the supervisory rules and the effect collaboration mechanism between the correlative departments during the course of the fulfilling of the convention.

#### **4.3 Challenges in the technical application of the by-products control**

Reducing and eliminating the PCDD/PCDF by-products emissions furthest with the best actual techniques (BAT) and the best environmental plans (BEP) is the requirement of the convention to all the signatory countries. Presently adopting the BAT and the BEP is accepted conceptually, but the practices of the BAT and the BEP are almost blank. In addition, as the largest developing country with the laggard technical and economic levels relatively, the double difficulties of the technique and the fund will be faced to reach the demand of the convention.

Though the technique and fund transfers are mentioned in the POPs convention, according to the experiences of the other international environmental conventions the validities of the technique and fund transfers need the harmonies of multiply of

connections and it is difficult to achieve the actual BAT. In addition, because the techniques, economic levels and the supervisory rules are different from the other countries the BEP will have the specialties of China. So the dioxin and furan controlling techniques must be collected tracked and studied using the advice of the experts at home and abroad to evaluate and select the controlling techniques of the dioxin and furan emissions.

Implementing the BAT and the BEP will be a far-flung and complex task involving the technical, economic and supervisory policies; also it is a task facing the conflict between the environmental protection and the economic development.

#### **4.4 Challenges in the propaganda and education aspects**

The public participation is the base of implementing any environmental protection. To control the PCDD/PCDF, the public participation and the self-conscious behaviors of the enterprises will be the effective measures. Therefore, acquainting the public with the POPs pollution and hazards is very important especially the PCDD/PCDF pollutants are difficult to find around the productions and lives of the people. However, in the more than 30 provinces and municipalities, there are different economic, technical and administrative levels; the developments of the same industry are different; so it difficult to hold a serious of propagandas, educations, consultations and training activities aiming the administrative officers, the enterprises technicians and common people.

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Appendix 4: Primary assessment report on management of POPs in China

## **Appendix 4:**

# **PRIMARY ASSESSMENT REPORT ON MANAGEMENT OF POPS IN CHINA**

Unedited draft English text of final report in Chinese

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## LIST OF ABBREVIATIONS

Chemical Oxygen Demand	COD
Civil Aviation Administration of China	CAAC
Customs General Administration	CGA
Economic and Trade Commissions	ETC
Environmental Impact Assessment	EIA
Environmental Protection Bureaus	EPB
Environmental Risk Assessment	ERA
Foreign Economic and Cooperation Office	FECO
Global Environment Foundation	GEF
Good Laboratory Practices	GLP
Hexachlorocyclohexane	HCH
Health Bureaus	HB
Hexachlorobenzene	HCB
Material Safety Data Sheets	MSDS
Ministry of Agriculture	MOA
Ministry of Chemical Industry	MCI
Ministry of Communication	MOC
Ministry of Foreign Economy, Trade and Cooperation	MFETC
Ministry of Health	MOH
Ministry of Public Security	MPS
Ministry of Railways	MOR
National implementation Plan	NIP
National People's Congress	NPC
Pentachlorophenol	PCP
Pentachlorophenol-Sodium	PCP-Na
People's Republic of China	PRC
Pollutant Release and Transfer Register	PRTR
Prior Informed Consent	PIC
Quality and Technical Supervision Bureaus	QTSB
State Administration of Quality Supervision, Inspection and Quarantine	SAQSIQ
State Administration of Work Safety Supervision	SAWSS
State Bureau of Technical supervision	SBTS
State Economic and Trade Commission	SETC
State Environmental Protection Administration	SEPA
Time Weighed Values	TWA
United Nations Industrial Development Organization	UNIDO

## INTRODUCTION

On May 23, 2001, China signed the Stockholm Convention on Persistent Organic Pollutants, which requires each party to develop a National Implementation Plan (NIP) within 2 years from the date of its entry into force. The PDF-B project preparatory for NIP, executed by the United Nations Industrial Development Organization (UNIDO), was approved by the GEF Secretariat on 20 December 2001. The main purpose of this project is to identify the requirements for developing a NIP in the People's Republic of China as a first step to implement the Stockholm Convention on POPs. On the basis of this step, to analyze necessary activities and cost required in the main phase of NIP stage.

The management system in this project goes deep into three parts, namely legislative/regulation, institution as well as their integration & conclusion. This subcontract is established to make integration and conclusion for both legislation/policies and institution parts in the management system component, and analysis on capacity building and legislation/regulations priorities and necessary activities and cost required in the main phase project (NIP stage).

The TOR of the subcontract requires that under the guidance of local consultant responsible for the overall conclusion of PDF-B project, the writer analyzes, assesses and integrates into a capacity building/legislation/regulation priority report on the basis of survey report prepared by local consultants on institution and legislature/regulation.

The report is divided into six sections. Section 1 gives an overview National legislative institutions and procedures for the establishment of laws and regulations; Section 2 describes environmental/sustainable development policy and general legislative framework; Section 3 introduces State enforcement mechanism for POPs supervision and control; Section 4 reviews laws and regulations related to POPs management and their enforcement situation; Section 5 analyzes challenges to be faced for implementing the POPs convention and the priority areas for improvement; Section 6 proposed activities required in the phase of NIP development with the cost estimation.

The report was co-completed by Professor Zhengyu LI from Environmental Protection Research Institute, Beijing Research Institute of Chemical Industry, SINOPEC and Ms. Hong WANG from Chemical Registration Center of SEPA. Ms. Hong WANG prepared and provided a preliminary report on national legislation/policies in relation to POPs management in China. Mr. Zhengyu LI also made complementary investigations on the main laws/ regulations, policies concerning POPs management in China as well as enforcement activities of the national and local authorities. On the above basis, he made integration and evaluation and prepared the report.



The authors express heartfelt thanks to valuable support given by the POPs project FECO/ SEPA and comments and suggestions from other consultants and experts.

## 1. NATIONAL LEGISLATIVE INSTITUTIONS AND PROCEDURES FOR THE ESTABLISHMENT OF LAWS AND REGULATIONS

### 1.1 National Legislative and Administrative Organs

According to the Constitution of the People's Republic of China, the National People's Congress (NPC) is the highest power organ in China. Its permanent organ is the standing committee of the NPC. The NPC and its Standing Committee exercise state legislative power. The NPC is composed of delegates selected from provinces, autonomous regions, municipalities directly under the central government and the army.

The NPC exercises the powers as follows:(1) amend a constitution;(2) supervise enforcement of the constitution;(3) formulate and amend basic laws, such as criminal laws, civil laws, state institutions, laws etc;(4) select the president and vice president of the PRC; (5) make decision on appointment of the premier of the state council according to the nomination made by the president of the PRC, make decisions on appointments of vice premiers, state councilors, ministers and commissioners of the ministries and commissions, general auditor, and secretary general according to the nomination made by premier of the state council;(6)review and ratify a national economy and social development plan and its implementation report and annual national budget and its implementation report. A plenary session of the NPC takes place once each year.

The Standing committee of the NPC is composed of chairman, vice chairmen, secretary general and committee members. The standing committee exercises the powers as follows:(1) explain the constitution and supervise its implementation; (2) formulate and amend other laws except the laws formulated and amended only by the NPC; (3) make some addition and amendment to the laws formulated by the NPC when the congress is not in session;(4) explain laws;(5) review and ratify some regulation options for national economy and social development plan and implementation of annual national budget when the congress is not in session;(6)supervise performances of the state council, central military committee, the Supreme people's Court and Supreme People's Procuratorate; (7) repeal administrative regulations, decisions and orders, which contravene the constitution and laws , enacted by the state council; (8) repeal local administrative regulations and decisions, which contravene the constitution, laws and administrative regulations, enacted by the local people' congresses of provincial, autonomous region and municipalities directly under central government; and (9)ratify and abate treaty and agreements with foreign countries.

The standing committee shall be responsible for and report works to the NPC. The NPC has several special committees including nationality committee, legal affairs

committee, foreign affairs committee, oversea Chinese committee, and environmental and resource committee, etc. Under leadership of the NPC and its Standing Committee, each special committee is responsible for study, review and formulation of different bills and proposals.

The president of the PRC is responsible for promulgation of laws, appointment and removal of the premier, vice premiers, state councilors and ministers of ministries and commissions, approval and cancel of treaty and important agreements with the foreign countries according to the resolution adopted by the NPC and its standing committee.

The state council, namely central government is the highest administrative organ and executive organ of the NPC in China. The state council is composed of the premier, vice premiers, state councilors, ministers in charge of ministries and commissions, general auditor and Secretary general. The state council practices the premier responsibility system. The premier is in charge of the whole work of the state council and convenes standing member meetings and plenary sessions. The ministries and commissions also practice the minister responsibility system.

The state council exercises the powers as follows:(1) formulate and promulgate administrative regulations, decisions and orders according to the constitution and laws;(2) submit a bill and proposal to the NPC and its standing committee; (3) stipulate the responsibilities and duties of different ministries and commissions, and command their works;(4) commend local administrative organs at different levels, and stipulate functions and responsibilities of administrative organs at central and provincial, autonomous region and municipalities; (5) formulate and exercise national economy and social development plans and national budget(draft), and exercise leadership in economy, urban and township construction, education, sciences, hygiene, physical education, civil administration, public security, judicial administration, etc;(6)manage foreign affairs and sign treaty and agreements with foreign countries;(7)change and cancel improper orders, instructions and rules issued by the ministries , commissions, and local administrative organs at different levels, etc.

The state council is responsible for and report to the NPC. She shall be responsible for and report to the standing committee when the NPC is not in session. The state council possesses the right to draw up administrative regulations, issue orders and decisions and give instructions to all ministries, commissions and local governments according to China's constitution and laws. The ministers are in charge of their respective ministries and commissions, call and convene ministry and department meetings to discuss and decide significant issues. Based on the laws and administrative regulations promulgated by the state council, the ministers in turn give instructions to their respective ministries and commissions and issue orders, regulations and rules within the scope of

their authorities.

The Supreme People's Court and Supreme People's Procuratorate are the highest state judicial organ and state judicial supervision organ, respectively. The PRC establishes Supreme People's Court and Supreme People's Procuratorate, local people's courts and local people's procuratorates at different levels. They exercise dependently judicial authority and adjudication supervision authority, respectively.

China's administrative areas are divided into four levels, namely province (autonomous region, municipality directly under central government), city with some districts (autonomous prefecture), county (autonomous county, small town), villages and township. At present, there are 34 provincial administrative areas, including 23 provinces, 5 autonomous regions, 4 municipalities directly under central government and 2 special administrative zones; 295 city with some districts (autonomous prefectures); more than 2,800 counties and more than 40,000 township administrative areas. All the provincial and below province administrative areas establish local people's congresses and local governments. There are also established standing committees of local people's congresses above the county level administrative areas. The local people's congresses are local power organs, and responsible for observation and enforcement of China's constitution, laws and administrative regulations within their jurisdiction. The local congresses and their standing committees at provincial level have right to draw up and promulgate local regulations under preconditions of without contravention of the constitution, laws and administrative regulations and report to the Standing Committee of the NPC and the State Council for putting on record.

Local governments at different levels are both local administrative organs and executive organs of local people's congresses. Local governments at provincial level and city with some districts level have right to formulate local rules according to laws, administrative regulations and local regulations enacted by local congresses. All local governments must obey orders and instructions issued by the state council. Various departments and divisions within local governments shall obey instructions given by their governments at same level and accept guidance given by departments concerned at upper level of governments.

China's legal system can be divided into three levels. The China's constitution and laws promulgated by the NPC and its Standing Committee are at the first level. The administrative regulations, orders and decisions issued by the state council according to the constitution and laws are at the second level. The regulations, rules and provisions issued by various departments of the government within the scope of their authorities according to the laws and administrative regulations are at the third level.

China's constitution has the top legal force. All the laws, administrative regulations, local regulations, autonomous region regulations and sector rules should not contravene the constitution. The legal force of laws is higher than any administrative regulations, local regulations and rules. The legal force of the administrative regulations is higher than any local regulations and rules.

## 1.2 Procedures for the Establishment of Laws and Regulations

### 1.2.1 Procedures for the establishment of laws by the NPC and its Standing Committee

According to the Law on legislation of PRC, the Standing Committee of the NPC, the State Council, special committees of the NPC, etc can submit a bill to the NPC. The presidium of the congress can decide if the bill will be added into the agenda of this session for review. During a plenary session each year, a bill will be commented and reviewed by the delegations from provinces and local cities. Then the special committee on legal affairs will collect all the comments and submit a review report on amendment opinions. The revised bill will form a law (draft) for adoption by vote. The presidium of the congress invites the delegates to vote by ballot. A law (draft) is voted through by more than half of the all delegates. At last, the president of PRC signed an order to promulgate the law for enforcement.

Procedures for the establishment of laws by the standing committee of the NPC areas follows: At first, the meeting of chairman of the standing committee, the State Council, special committees of the NPC, etc can submit a bill to the Standing Committee, then the meeting of chairman of the Standing Committee can decide if the bill will be added the agenda of this session for review. The special committee on legal affairs will collect comments to a bill from members of standing committee and other special committees and submit a review report on amendment opinions. After several discussions and amendments are done, the bill will form a law (draft) for adoption by vote. The law (draft) will be voted through by more than half of members of the standing committee at a plenary session. Generally it needs to review three times for a bill to form a law (draft). At last, the president of the PRC signed an order to promulgate the law for enforcement.

According to the China's constitution and laws concerned, the local people's congresses at provincial level can formulate, amend and cancel local regulation in accordance with the similar procedures.

### 1.2.2 Procedures for the establishment of regulations by the State Council and the affiliated ministries

According to the Provisional Regulations on Procedures for the Establishment of Administrative Regulations issued by the State Council in April 1987, Procedures for the Establishment of Administrative Regulations can be divided the following steps: (1) work out a legislative plan. At first, a proposal on establishment of a regulation is submitted by the ministries concerned to the office of legal affairs of the State Council. Then the Office studies, coordinates and makes an annual plan on establishment of regulations and submits the state Council for approval. (2) draw up. The regulation (draft) on the list of an annual plan will be formulated by the ministry or commission concerned, respectively; (3) consultation and coordination. After a regulation (draft) is formed, it should be sent to other ministries concerned for comment. When the provisions of the regulation (draft) involve in authorities and functions of other ministries, all the ministries concerned should reached agreement on these provisions. If there is any different opinions existed after full consultation, a specific description on this matter should be made when the regulation (draft) is submitted to the Office of Legal Affairs. The ministry in charge of drawing up the regulation (draft) should hear comments and opinions from experts, other personnel concerned and local governments in order to make the regulation accord with actual situations and enforce easily. (4) Review and approval. The ministry in charge of drawing the regulation (draft) shall submit the regulation (draft) to the State Council for approval after the formulation work is finished. (5) Promulgation. The administrative regulations reviewed and approved by the standing meeting of the State Council or the State Council will be promulgated by an order signed by the premier. The Regulations and rules reviewed and approved by the meetings of directors of departments or the minister will be promulgated by an order signed by the ministers; (6) put on file. The regulations and rules issued by ministries and commissions of the State Council shall be submitted to the State Council for putting on file within 30 days from the day they were promulgated.

### 1.2.3 Enforcement of laws, regulations and rules

The laws, administrative regulations generally authorize one administrative organ of the state council and local governments to perform enforcement and supervision based their scopes of application. Other governmental organs concerned will be authorized to cooperate the supervision and management work within their scope of authorities. When application scope of an administrative regulation involve in authorities and functions of several ministries and enforcement of the regulation needs participation and cooperation of these ministries, the regulation will authorize several ministries to enforce the provisions, and define specific responsibilities of each ministry.

After effective date of the regulation, the ministry authorized to perform enforcement will formulate implementing rules or specific management methods according to provisions of the administrative regulations and submit them to the State Council for

approval. The ministry will perform enforcement and supervision activities after the implementing rules are approved and promulgated by the State Council. In the course of enforcement, the ministry can issue an order of the minister and a notice to interpret the regulations and make further provisions.

## 2. ENVIRONMENTAL/SUSTAINABLE DEVELOPMENT POLICIES AND GENERAL LEGISLATIVE FRAMEWORK

### 2.1 National Environmental Policy and Guiding Principles

Since the UN human environmental conference in 1972, China has begun to strengthen the work on environmental legislation. A legal system of environmental protection has been developed now after 30 years of exploration and practices. Environmental protection has been regarded as one of the basic national policies. The state adheres to the policy on “economic construction, urban construction and environmental construction are developed at same time” and decides to implement sustainable development strategies.

China’s policy system on environmental protection includes three important policies, namely: prevention policy, treatment and control policy and environmental management policy.

The contents of the prevention policy include:

- Bring environmental protection into line with the national economy and social development planning;
- Carry out integrate renovation and control on the basis of city characteristics, construction scale and the main targets of environmental improvement and pollution control;
- Strengthen environmental management of construction projects, strictly control generation of new pollution sources.

The treatment and control policy follows “ the polluter pays principle” and its main contents include:

- Combine technological transformation with industrial pollution prevention and control;
- Practice policy on treatment and control of industrial pollution within a definite time;
- Practice to impose discharge fee.

Chinese government has stressed that environmental pollution should prevented and controlled by means of strengthening environmental management since 1979. The main contents of environmental management policy include:

- Formulate and perfect environmental laws and regulations, each trades and business should comply with the provisions of the laws;
- Set up environmental management institutions at different levels, strengthen supervision and management;
- Widely conduct propaganda and education on environmental protection.



Chinese government also formulated eight basic systems on environmental protection, including the Environmental Impact Assessment, “three synchronization system”, impose discharge fee, quantitative check-up system for integrate renovation and control of city environment; pollutant discharge permit system; promoting centralized treatment and control of industrial pollution; and treatment and control of industrial pollution within a definite time.

The state policies and strategies on environmental protection, safe management of hazardous chemical and sustainable development have been provided for by the China’s Constitution, the Law on Environmental Protection of the PRC and other laws, regulations and official documents. Some descriptions and statements on the environmental protection in these laws and documents are summarized as follows:

- The Constitution of the PRC (the article 26) stipulates that the state protects and improve living environment and ecological environment, prevent and eliminate pollution and other hazards.
- The Law on Environmental Protection of the PRC (the article 33) provides that production; storage, transport, distribution, and use of toxic chemicals and radioactive goods shall comply with provisions of the laws and regulations concerned to prevent environmental pollution.
- The State Technical Policies in the Fourteen Key Technical Fields issued by the State Commission of Sciences in 1988 provides that all the construction projects should adopt low or non-waste processes and facilities as far as economically feasible to control creation of new pollution strictly.” “To control strictly introduction of raw materials, products, processes and equipment with both severe pollution and difficult treatment and control from foreign countries, prevent transboundary movement of pollution sources into the country”, “to research & develop new techniques and methods on package, containerized traffic, storage and destruction of toxic and hazardous chemicals, strictly enforce registration systems of toxic chemicals”.
- Country report submitted by the Chinese government delegate at the UN Summit Conference on Environment and Development Summit in 1992 describes China’s ten significant policies and strategies on environment and development. The policies stress that China practices sustainable development strategies and require that strictly implement industrial development policy, eliminate those processes, equipment and products that have both high consumption rate of energy and resources and severe pollution in the adjustment of industrial structure. During the new, as well as expansion or transformation of construction projects, adopt clean processes and technologies with both low consumption of energy and materials and low wastes. The enterprises should be responsible for treatment of their wastes generated, adhere to the polluter pays principle, the enterprises are not allowed to make a profit by shifting pollution upon the society.
- The China Agenda for the Twenty-First Century prepared by Chinese government in 1994 put forward to the objective of a struggle on coordinating development of population, economy, society and resources in China in the 21 century. The ninth chapter “hygiene and health” of official document points out that through law-making and public participation to control production and use of toxic and hazardous chemicals, reduce human intake of pollutants from food source, especially reduce accumulation of heavy metals, pesticides and organochlorine compounds in human body and the environment.

- The Decision on a Certain Matters of Environmental Protection issued by the State Council in August 1996 makes specific arrangements for implementing sustainable development strategies. The decision requires that all the chemical construction projects should raise technical start point, adopt clean technologies with low consumption of energy and materials and low wastes, must not adopt the processes and equipment forbidden by the government.
- To follow strictly the process of the EIA and the management system of “three synchronizations”, i.e. the facilities for pollution prevention and control should be designed, installed and put into operation with the main facilities.
- According to the Basel Convention on Control of Transboundary Movement of Hazardous Wastes and Their Disposal, the transboundary movement of hazardous wastes from foreign countries to China is forbidden.
- To strengthen propaganda and education of environmental protection, widely popularize and disseminate knowledge on environmental sciences and legislation to raise all-nation’s environmental awareness and legal senses. To establish public participation mechanism, give full play to social organizations’ role, encourage the public to participate in environmental protection, inform against breach of laws and regulations on environmental protection.

The Law on Promoting Cleaner Production of the PRC adopted by the Standing Committee of the NPC in June 2002 provides that the state encourages and promotes cleaner production, bring cleaner production into the national economy and social development plan and other development planning on environmental protection, resource utilization\ industrial development and regional development, etc.

- The state encourages to conduct scientific research, technical development and international cooperation on the cleaner production, organize propaganda and dissemination of cleaner production knowledge and spread the cleaner production techniques.
- The state encourages social organizations and the public to participate in propaganda, education, promotion, implementation and supervision of cleaner production.

Therefore, to protect human health and the environment from pollution and hazard has become one of the important components of China’s sustainable development strategies.

## **2.2 National Environmental Regulatory Framework**

Since the 1970s, China has begun to strengthen the work on environmental legislation. Besides there is an article on protection of environment and natural resources in the Constitution of the PRC, a series of laws and regulations concerning environmental protection, such as the Law on Environmental Protection of the PRC, the Law on Air Pollution Prevention and Control of PRC, the Law on Water Pollution Prevention and Control of the PRC and the Law on Solid Waste Pollution Prevention and Control of the PRC have been promulgated. In addition, the State Council prepares and promulgates

national administrative regulations for environmental protection, whereas related ministries issue within their scope of functions and authorities regulations and rules concerning specific aspects of environmental protection. A legal system of environmental protection and safe management of hazardous chemicals has been preliminarily developed.

China's legal system of environmental protection consists of five parts, namely: the Constitution of the PRC; environmental laws and regulations promulgated by the NPC and the State Council; regulations and rules issued by the various departments of the government; environmental standards; and international treaties on environmental protection.

The Constitution of the PRC is the basis and core of China's legal system of environmental protection. The Law on Environmental Protection of the PRC is the basic law of environmental protection in China. The environmental laws, regulations and rules involved in POPs management are shown in the Table 1.

**Table 1 The main environmental laws, regulations involved in POPs management**

Law/regulation name	Issued by	Execution date	Scope of application
Law on environmental protection of the PRC	Standing Committee of the NPC	1989 amendment	Basic law of environmental Protection
Law on Water Pollution Prevention and Control of the PRC	Standing Committee of the NPC	1995 amendment	Prevention and control of pollution of rivers, lakes, canals, reservoir, surface and underground water
Law on Air Pollution Prevention and Control of the PRC	Standing Committee of the NPC	2000 amendment	Prevention and control of air pollution, protection of living and ecological environment
Law on Solid Waste Pollution Prevention and Control of the PRC	Standing Committee of the NPC	1996	Prevention and control of pollution of solid wastes and hazardous wastes
Law on Ocean Environmental Protection of the PRC	Standing Committee of the NPC	1999 amendment	Protection of ocean environment and resources, prevention of pollution and damage
Regulations on Environmental Management of Construction Projects	State Council	November, 1998	Environmental management of chemical and other construction projects
Regulations on environmental management of first import of chemicals and import/export of toxic chemicals	SEPA, etc.	May, 1994	Import/export management of China's banned and severely restricted chemicals
Provisional Regulations on environmental management of import of wastes	SEPA, etc.	1996	Environmental supervision of import of wastes
Regulations on prevention of environmental pollution of electrical equipment containing PCBs and its wastes	SEPA, etc.	January, 1991	Management of electrical capacitors and transformers containing PCBs and PCBs wastes

The state also issued a series of environmental standards, pollution control standards and health standards on chemical pollutants, hazardous wastes, etc. (see Table 2).

**Table 2 Main environmental/ health standards involved in pollution control of POPs**

Standard name and Number	Issued by	Scope of application
Standards on integrated discharge of sewages ( GB8978-96)	SEPA	Maximum allowable discharge amount of some sectors; maximum allowable concentrations of 69 pollutants
Standards on integrated discharge of air emissions ( GB16297-1996)	SEPA	Maximum allowable concentrations of 33 pollutants
Standards on pollution control of PCBs wastes (GB13015-91)	SEPA	Collection, storage, transport, treatment and disposal of PCBs wastes
Standards on pollution control of incineration of hazardous wastes ( GB18484-2001)	SEPA/SAQSIQ	Location, technical performances of incinerators of hazardous wastes; discharge limit of dioxins in emissions
Standards on pollution control of storage of hazardous wastes ( GB18596-2001)	SEPA/SAQSIQ	Locating of storage site, package and labeling of containers of hazardous wastes
Standards on identification of hazardous wastes ( GB5085-1996)	SEPA	Identification methods of hazardous wastes
Standards on pollution control of incineration of household refuses ( GB18485-2001)	SEPA/SAQSIQ	Locating of refuse incinerators, technical performances, and pollutant limits of dioxins in the emissions
Standards on quality of fishery water ( GB11607-89)	SEPA	Control limits of DDT and HCH in fishery water
Standards on quality of sea water ( GB3067-1997)	SEPA	Control limits of DDT, etc. toxic substances in three types of sea fields
Standards on environmental quality of surface water ( GHZB1-1999)	SEPA	Concentration limits of HCB, PCB, and DDT, etc. in three types of surface water
Standards on environmental quality of underground water ( GB/T14848-1993)	SBTS	Control limits of DDT, etc toxic substances in five types of underground water
Standards on hygiene of drinking water ( GB5749-85)	MOH	Pollutants limits of DDT, etc. in household drinking water
Standards on environmental quality of soils ( GB15618-95)	SEPA	Control limits of DDT, etc. toxic pollutants in three types of soils
Technical practices on monitoring of environmental quality of soils in farmland ( NY/T395-2000)	MOA	Environmental monitoring items, analysis methods and analysis quality control in the laboratories
Norms on monitoring of water environment ( SL219-98)	MWC	Water pollutant monitoring of surface, underground and precipitations and quality control in the laboratories
Standards on pollutants control of DDT and HCH in foods ( GB2763-81)	MOH	Pollutant control limits of DDT, HCH etc hazardous substances in foods, vegetables, eggs, fruits and teas
Standards on hygiene limits of PCBs in seafood ( GB9674-88)	MOH	Hygiene limits of PCBs in seafood
Standards on hygiene of cosmetics ( GB7916-87)	MOH	The list on 359 banned substances, including HCB, dieldrin and DDT in the cosmetics

In addition, China is a signatory country to international treaties or agreements on environmental protection, such as the Vienna Convention for Protection of the Ozone

Layer (1985), the Basel Convention on the Control of Transboundary Movements of hazardous Wastes and Their Disposal (1989), and the Loudon Guidelines for Exchange of Information on Chemicals in International Trades (1989), etc. These are also components of the Chinese legal system of environmental protection.

At present, Chinese government has signed the Rotterdam Convention on PIC Procedures for Certain Hazardous Chemicals and Pesticides in International Trade and the Stockholm Convention, these conventions will become a component of the Chinese legal system on environmental protection when they are reviewed and ratified by the NPC.

### 2.3 National Regulatory framework for Safe Management of Hazardous Chemicals

In order to protect human health and the environment, under the guiding policy on the safety is first importance, put prevention first, Chinese government has formulated a series of specific laws, regulations and rules on safe management of pesticides, hazardous chemicals, pharmaceuticals and veterinary medicines. At present, the state practices a registration system for production, sale and import/export of hazardous chemicals, and a review/ approval system for use, storage and transport of hazardous chemicals. The laws, regulations and rules involved in safe management of hazardous chemicals and pesticides (including POPs) are shown in the Table 3.

Table 3 the main laws, regulations and rules concerning safe management of hazardous chemicals and pesticides

Law/regulation name	Issued by	Execution date	Scope of application
Law on Work Safety of the PRC	Standing Committee of the NPC	November, 2002	Supervision and management of work safety, emergency response
Regulations on safe management of hazardous chemicals	State council	March, 2002	Production, sale, use, import/export of hazardous chemicals supervision of major accident sources
Regulations of management of pesticides	State council	November, 2001 amendment	Registration, production permit, safe use and import of pesticides
Law on hygiene of foods of the PRC	Standing Committee of the NPC	October, 1995	Sanitation and production of foods
Law on Prevention and treatment of occupational diseases of the PRC	Standing Committee of the NPC	May, 2002	Prevention and treatment of occupational diseases, supervision of occupational health
Regulations on labor protection at the workplace of use of toxic substances	State council	April, 2002	Labor protection of occupational poisoning of toxic substances at work
Regulations on hygiene supervision of cosmetics	State council	January, 1990	Production and business management of cosmetics

Rules on management method of business permit of hazardous chemicals	SETC	November, 2002	Permit management of purchase and sale of hazardous chemicals
Rules on management method of production permit of industrial products	SAQSIG	June, 2002	Product quality and safety, issuance of production permit
Rules on safe use of chemicals at work	Former ML/MCI	December, 1996	Responsibilities and obligations of institutions who produces, uses and transports chemicals; and preparation of MSDS
Rules on registration management of hazardous chemicals	SETC	November, 2002	Registration management of hazardous chemicals
The list on eliminating backward production capacities, processes and products (the first)	SETC	February, 1999	Eliminations of PCBs, chlordane, and heptachlor, etc. products
Rules on prevention and control of termite in the urban houses	MC	November, 1999	Prevention and control of termite in the urban houses
Rules on transport management of dangerous goods by the railways	MOR	January, 1996 amendment	Transport management of dangerous goods by railways
Rules on transport management of dangerous goods by river-ways	MOC	1996	Transport management of dangerous goods by river-ways
Rules on transport management of dangerous goods by roadways	MOC	1993	Transport management of dangerous goods by roadways

The State has also promulgated a series of national standards and technical practices on classification, storage, transport, packaging and labeling of hazardous chemicals since 1986(see Table 4).

Table 4 the main national standards on safe management of hazardous chemicals including POPs

Standard name and number	Issued by	Scope of application
Standards on classification and labeling of common hazardous chemicals (GB 57-92)	SBTS	Hazard classification and package labeling
Standards on rules on preparation of safe labels of hazardous chemicals (GB/T 15258-94)	SBTS	Contents, format, print and use of safe labels
Standards on the list of dangerous goods (GB 12268-90)	SBTS	Name-list and code number of hazardous chemicals
Standards on hazard levels of occupational exposure of toxic substances (GB 5044-85)	SBTS	Health hazard classification levels of toxic chemicals at work environment
Standards on rules of transport package classification of dangerous goods (GB/T 15089-94)	SBTS	Package classification and divisions of dangerous goods
Standards on package labeling of dangerous goods (GB 190-90)	SBTS	Types, names, sizes and colors of package labels of dangerous goods
Standards on storage rules of dangerous goods (GB15603-1995)	SBTS	Storage modes, management of entering and outing warehouses and waste disposal
Standards on generally technical conditions of transport package of dangerous goods (GB12463-90)	SBTS	Technical specifications of package of dangerous goods at transport

Standards on classification and labeling of common hazardous chemicals (GB13690-92)	SBTS	Classification and labeling of common hazardous chemicals
Standards on occupational exposure limits of harmful factors at work (GBZ 2-2002)	MOH	Maximum allowable concentrations of DDT, Chlorobenzene, etc. toxic substances at work
Standards on safe use of pesticides (GB4285-89)	SEPA	Safe use of pesticides
Standards on guidelines on sound use of pesticides (1- 5); (GB8321.1-5, 87-97)	SBTS	Criteria for safe use of pesticides
Standards on rules of preparation of MSDS (GB16483-2000)	SBTS	Contents and format for preparation of MSDS of chemicals

In addition, China is a signatory country to international treaties or agreements on safe control, such as the Convention on Safe Use of Chemicals at Work and its recommendations (ILO no. 170/177) (1990) and the Convention on forbidding Protection of the Ozone Layer (1985), the Basel Convention on the Control of Development, Production, Storage and Use of Chemical Weapons and Their Destruction, etc. These are components of the Chinese legal system of safe management of hazardous chemicals.

### 3. STATE INSTITUTIONAL FRAMEWORK FOR POPS SUPERVISION AND CONTROL

The state council, namely central government is the highest administrative organ and executive organ of the NPC in China. According to China's Constitution and laws, the state council has the right to draw up administrative regulations, issue orders and decisions, and give instructions to all ministries, commissions and local governments.

Since the structural reform of administrative departments under the State Council in 1998, there are seven ministries involved in direct supervision and management of the POPs as follows: State Environmental Protection Administration (SEPA); Ministry of Agriculture (MOA); State Economic and Trade Commission (SETC); State Administration of Work Safety Supervision (SAWSS); Ministry of Health (MOH); State Administration of Quality Supervision, Inspection and Quarantine (SAQSIQ) and Customs General Administration (CGA). In addition, during the course of implementation of the POPs convention and preparation of the NIP, there are other more than 10 ministries and commissions, such as the Ministry of Foreign Affairs, State Commission of Development and Planning, Ministry of Construction, etc. will play an auxiliary support role in the scientific decision-making, convention negotiation, management of use, transport and import/export of POPs, development of sciences and technologies and education.

There are local Environmental Protection Bureaus (EPB), local Agriculture Bureaus (AB), local Economic and Trade Commissions (ETC), local Health Bureaus (HB), local Quality and Technical Supervision Bureaus (QTSB), etc established at the provincial (autonomous regions and municipalities) governments as well as other local governments of cities with some districts and counties at different levels in the country. These administrative departments are in charge of environmental protection and safe supervision of hazardous chemicals (POPs) and pesticides within their jurisdiction.

The description for the administrative organs of POPs supervision in China can see also the project report—"Review Report on the POPs Stakeholders in the People's Republic of China".



## 4. LAWS AND REGULATIONS RELATED TO POPS MANAGEMENT AND THEIR ENFORCEMENT SITUATIONS

According to the provisions for by the laws and regulations in China, discharge of the 12 POPs into the environment and disposal of their wastes should comply with the environmental laws and regulations, such as the Law on Solid Waste Pollution Prevention and Control of the PRC, the Law on Air Pollution Prevention and Control of the PRC, and the Law on Water Pollution Prevention and Control of the PRC, etc.

### 4. 1 Pollution Prevention and Control of POPs Hazardous Wastes

#### 4.1.1 Pollution prevention and control of hazardous wastes

##### Law on Solid Waste Pollution Prevention and Control of the PRC

Law on Solid Waste Pollution Prevention and Control of the PRC was promulgated in October 1995 and put into force in April 1996. The law applies to pollution prevention and control of household refuses and industrial solid wastes. There are special provisions for pollution prevention and control of generation, collection, storage, transportation and recycling of hazardous wastes in the law. The SEPA and local EPB are authorized by the law to uniformly supervise enforcement of pollution prevention and control of solid wastes.

According to the law, the state practices several systems including the list of hazardous wastes, the report and registration, the transport manifest and the permit for import/export.

##### The list of hazardous wastes

According to the Law of Solid Waste Pollution Prevention and Control, the SEPA, the SETC, the MFETC and the MPS jointly promulgated the list of hazardous wastes in January 1998. Hazardous Wastes in the list are divided into 47 classes. The wastes containing 12 POPs are include in the following classes in the list:

The class 4: pesticide wastes (include organ-chlorine pesticides wastes;

The class 10: PCBs wastes (include PCBs, PBBs and PCTs wastes);

The Class 43: PCDFs wastes;

The Class 44: PCDDs wastes.

##### The report and registration system

According to the Law of Solid Waste Pollution Prevention and Control, the state practices report and registration system of industrial solid wastes. Any institution that

generates hazardous wastes shall report the local EPB and apply for registration according to the provisions for by the law. The SEPA conducted trial works on report and registration of hazardous wastes all over the country in 1994-1996. The contents for report and registration include waste sources, generation, storage, discharge, recycling and disposal, etc. The report and registration work continues each year after end of trial work.

#### The transfer manifest system

According to the Law of Solid Waste Pollution Prevention and Control, any institution that wants to transfer hazardous wastes shall fill in the transfer manifest and report to local EPB at above county level located in both the departure point and reception place of hazardous wastes.

The SEPA issued the Rules on Management of Transfer Manifest of Hazardous Wastes in May 1995. The Rules provide that any generator shall submit its transfer plan of hazardous wastes to local EPB concerned for approval before shipment of the wastes. After the plan is approved, the generator shall apply to the local EPB located in departure place for the transfer manifest (in five duplications) and make a notice on the departure date and due time for arrival of the wastes to the local EPB concerned before shipment of hazardous wastes.

The first page of the manifest should be correctly filled in and sealed by the waste generator, then be checked and signed by the carrier. The generator should keep a copy of the first page. The second page should be submitted to the local EPB located in the departure place of wastes; The first page and the other pages taken by the carrier of the wastes should be accompanied with the transport and given to the local EPB at reception place and the institution receiving the wastes for review and reception.

#### Provisional rules on environmental management of import of wastes

The Law of Solid Waste Pollution Prevention and Control provides that dumping, stockpile and disposal of solid wastes imported from foreign countries within the territory of the PRC are forbidden. Transfrontier movement of hazardous wastes is also forbidden. The state forbids import of solid wastes that cannot be reused as raw materials, restricts import of solid wastes that can be reused and recycled.

In order to implement the Basel Convention, the SEPA, the MFETC, the CGA promulgated Provisional Regulations on Environmental Protection Management of Import of Wastes. The provisional regulations give a list on import of wastes restricted by the state. The list contains 10 types of wastes including bone wastes; metal smelting residues; wood wastes; waste papers; textile wastes; waste metal trash, waste electrical

appliances; old ship vessels; plastic wastes and special wastes. Import of the wastes on the list should be reviewed and approved by the SEPA. Import of the wastes that are not on the list is strictly forbidden.

An enterprise that wants to import the wastes must fill in an application form and submit an environmental risk assessment report for import of the wastes. The application and the ERA report should be reviewed and agreed by local EPB and the provincial EPB. Then it should be submitted to the SEPA for approval and issuance of the permit. The department in charge of goods inspection will examine the wastes imported and issue a certificate for clearance when the wastes arrive at the port. The customs department examines wastes and give clearance by the import permit and certificate for clearance.

The SEPA and the SBTS issued 11 national standards on environmental protection of the imported wastes in 1996. These national standards give control limits of maximum allowable amount of pollutants in the wastes.

#### 4.1.2 Management and disposal of PCBs wastes

##### Regulations on Prevention of Environmental Pollution of Electrical Equipment Containing PCBs and its Wastes

The SEPA and the former Ministry of Energy promulgated Regulations on Prevention of Environmental Pollution of Electrical Equipment Containing PCBs and its Wastes in March 1991 to control use of PCBs electrical equipment and collection, storage, transport, treatment and disposal of PCBs wastes. The regulations provide that any institution that has an electrical equipment containing PCBs should apply to local EPB for registration. Transfer, treatment and disposal of the PCBs electrical equipment and PCB wastes must notify the local EPB for approval 15 days ahead of time. An institution who is using PCB electrical equipment must take appropriate measures to prevent leakage of PCBs and pollution of the environment. The institution and its upper authorities should make specific safe management method.

Any institution and person are strictly forbidden to sell, purchase and break up electrical equipment containing PCBs. The treatment and disposal of PCBs wastes cannot be done until the activities are reviewed by local EPB at city level and approved by provincial EPB. PCB electrical equipment and waste PCBs should be centrally sealed up for safekeeping. The operation at storage places should be approved by provincial EPB and be conducted at the supervision of local EPB at city level.

Locating and design of sites for temporary storage or sealing up must comply with the Norms on Design of Warehouses for Temporary Storage or Sealing up of PCBs Wastes. Construction of the central storage warehouse must conduct environmental impact assessment. A management system should be established in the central storage

warehouses. It should be done to take effective safeguard measures, set up obvious warning mark on toxic substance, regularly conduct environmental monitoring within storage site and areas affected possibly.

Water bodies and soils contaminated by PCBs should be treated and managed according to the pollution control limits for water and soil polluted by the PCBs (provisionally). Import of electrical equipment containing PCBs, PCB wastes from foreign nations into the country are strictly forbidden.

Technical Policies on Pollution Prevention and Control of Hazardous Wastes

The SEPA, the SETC and the Ministry of Sciences and Technology issued the Technical Policies on Pollution Prevention and Control of Hazardous Wastes in December 2001. The technical policies provide that management target and general principles of hazardous wastes and a series of guiding policies on waste minimization, collection, storage, transport, reuse and recycling, incineration and secure landfills, treatment and disposal techniques and equipment.

The policies provides the following requirements for management of PCBs wastes:

(1) PCBs wastes should be centralized to incinerate in the special incinerators as soon as possible and should not be disposed in other means. The special incinerators of PCBs wastes should comply with the requirements of the national standards on pollution control of incineration of hazardous wastes;

(2) Management, storage and disposal of PCBs wastes should comply with the Regulations on Prevention of Environmental Pollution of Electrical Equipment Containing PCBs and its Wastes;

(3) The PCBs wastes that have been centrally sealed up for more than 20 years or less than 20 years but have caused environmental pollution should be incinerated within a definite time;

(4) Newly abandoned electrical equipment containing PCBs must be disposed by means of incineration. The equipment that cannot be sent to incinerate because of difficulties can be temporally sealed up for safekeeping, but its sealing period should not exceed more than three years. The location and design of the warehouses for sealing up of PCBs wastes must comply with the requirements of the Norms on Design of Warehouses for Temporary Storage or Sealing up of PCBs Wastes. Construction of the central storage warehouse must conduct environmental impact assessment.

(5) It should be strengthened to monitor and manage PCBs wastes and their storage

facilities and track disposal activities of hazardous wastes containing PCBs.

In recent years, the SEPA has issued some standards on pollution control of PCBs, such as Standards on pollution control of storage of hazardous wastes( GB18596-2001) that provide locating of storage sites, package containers and environmental identities; the Standards on pollution control of PCBs wastes(GB13015-91) that provide pollution control limits and disposal methods of PCBs wastes; the Standards on pollution control of incineration of hazardous wastes(GB18484-2001)that stipulate burning temperatures in the incinerator of PCBs wastes should be more than 1200? , retention time should be over 2.0 seconds, destruction rate should exceed 99.9999%, the maximum allowable discharge concentration of dioxins is less than 0.5TEQng/m<sup>3</sup>?

## 4.2 Pollution Control for POPs Air Emissions and Wastewater Discharges

### 4.2.1 Pollution control for POPs air emissions

#### Law on Air Pollution Prevention and Control of the PRC

Law on Air Pollution Prevention and Control of the PRC was promulgated in September 1987 and amended twice in 1995 and 2000. The law provides general principles and supervision of air pollution, prevention and treatment of fly ash, waste gases, suspended particles and stench. The SEPA and local EPBs are authorized by the law to uniformly supervise enforcement of pollution prevention and control of air pollution.

The law provides that any institution who discharges air emissions to the environment shall notify its air pollutant discharge facilities, treatment facilities and types, quantities and concentrations of air pollutants at normal operation to local EPB, and provides with technical materials concerning prevention and treatment of its air pollutants.

The SEPA is responsible for formulation of national standards on discharge of air emissions. Provincial governments can formulate local standards on discharge of air emissions for the air pollutants that there are no national standards existed or can formulate local standards stricter than the national standards for the air pollutants listed on the national standards. Air pollutants discharged into local atmospheric environment should meet the local air emission standards so long as the local government has formulated local standards.

The State council and Provincial governments can designate the areas where have not attained the standards on environmental quality of air and the “acid-rain control zones” and “SO<sub>2</sub> control zones” approved by the state council as “control zones for total loads of

air pollutants”. An emission permit will be issued to air pollutants emitted from an institution located within the control zones of total loads of air pollutants. Air pollutants discharged from these institutions must comply with the total loads of main air emissions and discharge conditions provided for by the emission permit.

There are only the emission concentration limits for chlorobenzenes ( $0.5\text{mg}/\text{m}^3$  for an existing source;  $0.4\text{mg}/\text{m}^3$  for a new source) on the list of controlled 33 air pollutants in the national standards on integrated discharge of air emissions (GB16297-1996). Discharge of dioxins in the flue gases of incinerators of hazardous wastes should meet the maximum allowable concentration limits provided for by the national Standards on Pollution Control of Incineration of Hazardous Wastes (GB18484-2001) and the Standards on Pollution Control of Incineration of Household Refuses (GB18485-2001). Air emissions of other POPs have not been controlled in China now.

#### 4.2.2 Pollution control for POPs wastewater discharges

##### Law on Water Pollution Prevention and Control of the PRC

Law on Water Pollution Prevention and Control of the PRC was promulgated in May 1984 and amended in May 1996. The law applies to pollution prevention and treatment of both surface water of rivers and lakes and underground water. The environmental protection departments at every level are authorized by the law to uniformly supervise enforcement of water pollution and treatment.

The law stipulates that any institution who discharges pollutants to water bodies shall notify its water pollutant discharge facilities, treatment facilities and types, quantities and concentrations of water pollutants at normal operation to local EPB, and provides with technical materials concerning prevention and treatment of its water pollutants. The institution that discharge pollutants to water bodies shall pay the discharge fees provided for by the state. When its pollutants exceed the national standards or local standards, the institution has to pay additional fees for over-discharge provided for by the state.

The SEPA is responsible for formulation of national standards on environmental quality of water as well as standards on discharge of water pollutants. Provincial governments can formulate local standards on discharge of water pollutants for the water pollutants that there are no national standards existed or can formulate local standards stricter than the national standards for the water pollutants listed on the national standards. Water pollutants discharged into local water bodies should meet the local water pollutant discharge standards so long as the local government has formulated local standards.

Provincial governments can practice the control system on total loads of pollutants in

water bodies where have not attained the national standards on environmental quality of water. The enterprises with reducing water pollutants loads will be enforced to carry out the check and ratification of discharge of water pollutants. Those who have caused severe contamination of water bodies must treat their water pollutants effectively within a definite time.

The law also provides that the state forbid to establish small sized enterprises that have no water pollution treatment facilities, such as chemical pulp paper factories, printing and dyeing mills; dyestuff factories; tanneries; electroplating factories; refineries; pesticide factories and other small factories with severe water pollution. Application of pesticides should comply with requirements of the rules on safe use of pesticides. The agricultural departments at above county levels should give farm workers a guidance how to use fertilizers and pesticides scientifically to prevent overuse of pesticides and fertilizers and pollution of the environment.

There are only concentration limits for hexachlorobenzene (0.05mg/l), PCBs ( $8.0 \times 10^{-6}$ mg/l) and DDT (0.001mg/l) in the national standards on environmental quality of surface water (GHZB1-1999). There are no the maximum allowable concentrations for other POPs, except chlorobenzenes on the list of 69 water pollutants in the Standards on integrated discharge of sewages (GB8978-96). Therefore, the state has no effective control measures for discharge of POPs pollutants.

#### *The Notice on Further Strengthening Supervision of Discharge of Wastewater from Pesticide Factories*

The SEPA, the MOA and former Ministry of Chemical Industry issued the Notice on Further Strengthening Supervision of Discharge of Wastewater from Pesticide Factories in October 1997. The notice requires that pesticide factories must strictly treat their wastewaters to ensure main pollutants, especially characteristic pollutants to meet local discharge standards.

In new as well as expansion or transformation of pesticide construction projects, water pollutants discharged from production processes should do the EIA; especially the characteristic pollutants should do the ERA. Local EPB should strictly review the EIA reports of these projects. Those projects that do not conduct the ERA or their ERA reports do not pass review process must not be approved.

All the pesticide enterprises that possibly discharge water pollutants with serious hazards to farm crops must establish storage tanks for accident discharge to contain high concentration of liquid wastes discharged during an accident. High concentration wastewater generated from an accident or equipment overhaul should be centrally treated instead of direct discharge. All the pesticide enterprises should promote cleaner

production and strengthen production management. Pesticide enterprises should regularly monitor their discharge of wastewater to ensure main pollutants to attain the discharge standards or requirements.

Local EPBs should strengthen supervision and monitoring of wastewater discharged from pesticide enterprises. Those enterprises that cannot attain the discharge standards should be enforced to treat their wastewater and meet the requirements within a definite time.

### 4.3 Import/Export Control of POPs

China is a signatory country to the Rotterdam Convention on PIC Procedures for Certain Hazardous Chemicals and Pesticides in International Trade and has the obligations to comply with the convention. At present, the Chemical Registration Center of the SEPA and the Institute for Control of Agrochemicals of the MOA are responsible for implementation of the PIC procedures in China.

#### Regulations on Environmental Management of First Import of Chemicals and Import/Export of Toxic Chemicals

The SEPA, the CGA and the MFETC jointly promulgated Regulations on environmental management of first import of chemicals and import/export of toxic chemicals in 1994. The regulations require that import/ export of the toxic chemicals on the list of China banned and severely restricted chemicals should be notified and registered.

According the regulations, any institution who wants to import a toxic chemical on the control list should apply to the SEPA for registration in advance. The importer will be given a registration certificate on environmental management of import of chemicals and a clearance notice for import of toxic chemicals when his application is reviewed and approved. Any institution that wants to export a toxic chemical on the control list should also apply to the SEPA for registration in advance. The SEPA will inform the authorities concerned of the import country. The applicant would be given a registration certificate on environmental management of export of chemicals and a clearance notice for export of toxic chemicals when the SEPA received a notice of consent from the import country. The applicant will be informed of the export refused if the authorities of the import country do not agree the import of these toxic chemicals.

The Customs officials will examine the goods and check the clearance notice issued by the SEPA to clear through the toxic chemicals. The POPs on the control list include aldrin, endrin, dieldrin, heptachlor, HCB, chlordane, DDT, toxaphene, and PCBs.



*The Notice on Implementing Registration Certificate for Import/Export of the PIC Pesticides*

According to the Notice on Implementing Registration Certificate for Import/Export of the PIC Pesticides issued by the MOA and the CGA, import/ export of any pesticides on the control list of PIC procedures of the Rotterdam convention should apply to the MOA for registration since the first of July 1999. The MOA will review the application and issue a registration certificate for import of the pesticide. The MOA will issue a registration certificate for export of the pesticide when it has received a notice of consent from the authorities of the import country. The Customs officials will examine the goods and check the registration certificate issued by the MOA to clear through the pesticides.

*The Notice on Change of Soak Materials of Electrical Capacitors*  
*The Notice on Preventing Pollution of PCBs*

The former Ministry of the First Machine Industry issued the Notice on change of soak materials of electrical capacitors in 1974 that provides it must terminate use of trichlorobiphenyl in manufacture of electrical capacitors. The former State Economic Commission and the former Leadership group of the State Council jointly issued the notice on preventing pollution of PCBs in 1979. The notice provides that in order to control of pollution of PCBs, it is not allowed to import any electrical equipment containing PCBs from now on. The competent department under the state council must approve any application for import of PCBs electrical equipment.

*The List on Goods for Banned Import (the third batch)*

The MFETC, the CGA and the SEPA jointly issued the list on goods for banned import (the third batch) in December 2001. The list requires prohibiting import of any waste oils and greases containing PCBs and PBBs.

*Regulations on registration management of import/ export of Hazardous Chemicals (draft for comment)*

According to the Regulations of Safe Management of Hazardous Chemicals issued by the State Council, the SEPA is authorized to supervise import of hazardous chemicals. At present, the SEPA is organizing to draw up the Regulations on Registration Management of Import/Export of Hazardous Chemicals. The regulations (draft) provide that the state practices registration management system for import/ export of hazardous chemicals. Import of hazardous chemicals and export of toxic chemicals among the hazardous chemicals will practice respective registration management depending on the list of classification management of import/ export of hazardous chemicals as follows:

(1) The state will prohibit import/ export of the chemicals on the list of banned import/export chemicals and refuse their registration applications;

(2) The state will restrict import registration for the chemicals on the restrictive import chemicals or permit their import registration for the chemicals on the list of automatically permit import chemicals, respectively;

(3) The state will practice restrictive export registration for the chemicals on the list of restrictive export chemicals.

Those who want to import or export a hazardous chemical shall apply the SEPA for registration and obtain the registration certificate and clearance notice to carry out these activities. The SEPA will formulate, amend and publish the control lists of chemicals jointly with the MFETC and the CGA in accordance with the PRC' s laws and regulations as well as the international treaties signed and approved by the Chinese government. Once the regulations put into enforce, the Regulations on environmental management of first import of chemicals and import/export of toxic chemicals promulgated by the SEPA, etc in 1994 will be abolished.

#### **4.4 Regulatory Management of Pesticides and Hazardous Chemicals**

According to the scopes of application of the laws and regulations on safe management of hazardous chemicals in china, all the 12 POPs are classed the hazardous chemicals and controlled under the regulations on management of hazardous chemicals. When the 9 POPs (aldrin, dieldrin, DDT, chlordane, heptachlor, HCB merix and toxaphene) are used as insecticides, they have to be controlled under the Regulations on Management of Pesticides.

##### **4.4.1 Environmental management of chemical construction projects**

###### *Regulations on Environmental Management of Construction Projects*

The State Council issued the Regulations on Environmental Management of Construction Projects in December 1998. The Regulation applies to all the construction projects that have environmental impacts, including POPs construction projects within the territory of the PRC. The regulations make provisions on the EIA system, preparation and review of the EIA report and construction of the environmental protection facilities. The SEPA and local EPBs are authorized to review and approve the EIA reports, check and accept environmental protection facilities of projects.

The regulation provide that the EIA report should include the following contents (1) general descriptions of the construction project; (2) current situations around the construction project; (3) analysis and estimation for environmental impact of the construction project; (4) environmental protection measures and their technical and

economic feasibility (5) benefits/cost analysis of environmental impact; (6) recommendations on environmental monitoring of the project; and (7) conclusions.

According to the provisions concerned, the EIA report prepared by construction institutions should seek opinions from the organizations and the public who live in the neighborhood of the construction site. The environmental protection facilities should be designed, constructed and put into operation together with the main production facilities at the same time. After completion of the project, the construction institution should apply the environmental protection authorities in charge of review and approval of the EIA of the project for check and acceptance of the environmental protection facilities.

In order to control production of chemicals that have severe pollution, the SEPA and former State Bureau of Petroleum and Chemical Industry jointly issued a notice on further enhancing environmental management of petroleum and chemical construction projects in August 2000. The notice stipulates all the EIA of construction projects of HCH, DDT and PCBs will not be reviewed and approved. The State Commission of Development and Planning, the SETC and the MFETC jointly issued the Guidance List of Industrial Projects invested by the Foreign Companies in March 2002. The List points out foreign companies are forbidden to invest those projects that produce chemicals with carcinogenic, distortion and mutation characteristics and POPs products.

#### 4.4.2 Production management of POPs pesticides

##### *Regulations on Management of Pesticides*

The Regulations on Management of Pesticides promulgated by the State Council in 1997 and amended in 2002. The pesticides defined by the Regulations include those chemical substances and preparations that are used to prevent, destroy and control diseases, insects, weeds and other harmful organisms in agriculture, forest, health, construction, dams, railways and other places as well as promote and regulate growth of plants and insect vectors. The regulations authorize the MOA to supervise registration and management of pesticides. According to the regulations, the state practices the three permits systems, i.e. the pesticide registration certificate, production permit and product quality standards.

##### *The Pesticide Registration System*

A manufacturer, formulator or importer of a pesticide must apply for registration. Any institution and person must not produce, sell, import or use a pesticide that is not approved and issued the pesticide registration certificate. An applicant shall provide the MOA with sample of his pesticide product and information materials that describe chemical, toxicological properties, efficacy, residues, environmental impact and labeling

of the pesticide provided for by the regulations. The application documents will be reviewed by the ministries under the State Council that are in charge of agriculture, permit management of industrial products, public health, environmental protection and the National General Agency of Supply and Marketing and Cooperation respectively. Then the review and appraisal committee of pesticides will make examination proposals on chemistry, toxicology, efficacy, residues, environmental impact, etc of the pesticide. Those pesticides that meet requirements provided for will be accepted to register and their applicant will be given registration certificate issued by the MOA. The Institute of Agrochemicals Control of the MOA is responsible for dealing with the specific work of registration.

According to the pesticide registration gazette issued by the institute of agrochemical control, among the 9 pesticides controlled by the convention, five pesticides including aldrin, dieldrin, endrin, heptachlor and mirex have never been approved to register since establishment of pesticide registration system in 1982. Registrations of toxaphene and chlordane were cancelled in 1996. Hexachlorobenzene did not apply for pesticide registration and was not used as a pesticide in China. DDT is the only product that maintains pesticide registration now, but it is not allowed to use as a pesticide now.

### *Production Permit System*

The regulations also provide that any institution and person must not produce a pesticide that is not given production permit or approval document by the authorities. Establishment of a pesticide production enterprise should meet the following conditions:

- has qualified technicians and operation workers;
- has proper production facilities, buildings and sanitation and environment conditions;
- has safety and health facilities in accordance with the national standards on labor safety and health and formulated corresponding management systems;
- has product quality standards and quality guarantee system;
- The product has been given registration certificate issued by the MOA;
- has environmental protection facilities required by the state and pollutants discharged from the enterprise meet the national or local discharge standards.

The Rules on Management Method of Production Permit of Industrial Products issued by the SAQSIQ in March 2002 provide that the state practices production permit system for the products that have important impact on protecting security of the state, human health and safety, lives of animals and plants as well as the environment. An enterprise that applies for production permit should meet the conditions as follows:

- Business scope of the enterprise shall cover the product;
- Quality of the product meets national, sectoral or enterprise standards;
- has correct and complete technical documents and process requirements;
- has suitable equipment, production facilities and measuring/examining instruments to assure quality of the product;
- has qualified technicians, skillful workers and quality examination personnel to guarantee normal operation;
- has complete and effective quality management systems;
- complies with other requirements provided for by the regulations and national policies.

An enterprise producing a pesticide with national standards or sectoral standards should apply the SAQSIQ for a production permit. Production permit documents for the enterprise producing a pesticide with only enterprise's standards are reviewed and issued by the pesticide production approval office under the SETC now.

### Product Quality Standard System

The Regulations on Management of Pesticides provide that enterprises producing a pesticide shall follow the pesticide quality standards and technical practices to produce their products. Quality of pesticide products should be examined before they leave the factory. Off-specification products will not be allowed to go out the factory to sell. At present, there are three levels of product quality standards i.e., national standards, sectoral standards and enterprise standards in China.

#### 4.4.3 Management of use of POPs pesticides

The Regulations on Management of Pesticide provide that any institution and person must not use a pesticide without registration. Any institution and person must not use a pesticide that is banned or its registration cancelled by the MOA. Use of pesticides should comply with the safe and sound use provisions. Application dose, frequency, application methods and interval period of pesticides should also comply with the provisions to prevent pollution of crops and farm products. Acute and high toxic pesticides must not be used to vegetables, melons, tea and Chinese medicine. Use of pesticides should pay attention to protect the environment, beneficial organisms and rare birds and animals. It is forbidden to kill fish, shrimp, birds and animals by toxic pesticides. Use of pesticides should observe the practices on preventing poisoning of pesticides, correctly formulate and apply preparations to prevent pollution of the environment and poisoning.

In order to enforce the regulations and protect human health, the MOA and other departments concerned regularly monitor use of pesticides and issue the list of the banned and severely restricted pesticides to control hazards of pesticides by means of issuance of

rules and notices. To counter production and use of high residue pesticides, such as HCH and DDT, the State Council, the MOA, the MOH and the former MCI issued a lot of regulations and notices. For example, the MOA and the MOH jointly promulgated rules on safe use of pesticides in June 1982. The rules provide HCH, DDT and chlordane must not be applied to fruit trees, vegetables, tea trees, Chinese medicine, and coffee crops. Chlordane can only be used in mixing seeds and control harmful insects underground.

*The Notice on Strengthening Management of Pesticides and Veterinary Medicines*

The Notice on Strengthening Management of Pesticides and Veterinary Medicines issued by The State Council in 1991 provides that agricultural use of some high residue pesticides, such as HCH and DDT, etc. would be forbidden from the year of 1992. During the implementation of the notice, the MCI and Ministry of Commerce are in charge of checking inventories in warehouses; the Ministry of Commerce will seek to safe treatment methods of waste pesticides jointly with the MOA, the MOH and the NEPA. From now on except the designated enterprise producing DDT and lindane for export and special needs approved by the State Council, any enterprise and person are forbidden to produce above pesticides. Production of above pesticides must carry out strictly according to production plans issued by the MCI. The departments of industrial and trade administration will be in charge of supervision of enforcement.

The Notice on Arrangement of Checking up the Banned and Restricted Pesticides issued by the former MCI in 1995 requires that the chemical industry bureaus at provincial level shall conduct checking up the banned and restricted pesticides to prevent agricultural use of DDT. The state only approved one enterprise (Tianjin chemical plant) to continue production of DDT for control of malaria and intermediate of dicofol, other enterprises must not produce DDT.

The MOA issued the Announcement (No.199) on the fifth of June 2002 that promulgates a list of banned and restricted pesticides. The banned pesticides include DDT, toxaphene, aldrin and dieldrin, etc. Dicofol must not be used to tea trees.

*Rules on Prevention and Control of Termite in the Urban Houses*

Rules on Prevention and Control of Termite in the Urban Houses promulgated by the Ministry of Construction in October 1999 provide that prevention and control of termite in the urban houses should use the pesticides approved by the departments concerned. Institutions that conduct termite control work should establish a system on receiving and use of pesticides. All the termite control pesticides should be stored in special storeroom and taken care of by a special person.

Construction institutions should sign a contract with the institution that conducts

termite control work. The contract should include the following contents: termite control areas, cost, quality criteria, check and acceptance, effective periods and responsibilities for violation, etc. The persistent period of a pesticide for termite control must not be less than 15 years beginning from the date of completion and acceptance. “ The persistent period of a pesticide for termite control must not be less than 15 years” provided for by the rules invented an excuse for illegal production and use of POPs pesticides (chlordane and mirex).

#### 4.4.4 Safe management of hazardous chemicals

##### Regulations on Safe Management of Hazardous Chemicals

The Regulations on safe Management of Hazardous Chemicals promulgated and amended by the State Council in 1987 and 2002. The regulations apply to any institution and person who carry out activities of production, sale, storage, transport and use of hazardous chemicals as well as disposal of wasted hazardous chemicals within territory of the PRC. The SETC and local ETC are authorized to enforce integral supervision of hazardous chemicals. The main responsibilities of the STEC are to review and approve setting up and expansion of enterprises producing and storing hazardous chemicals; issue business and trade permit; safe registration of hazardous chemicals produced in the country; organize and coordinate emergency response of chemical accidents and supervise enforcement of above work. The SEPA is authorized to supervise disposal of wasted chemicals; investigate major chemical accidents and ecological destruction incidents; in charge of emergency monitoring at scene of a chemical accident and registration of imported hazardous chemicals. The regulations also provide responsibilities of the Ministry of Public Security, the SAQSIQ, the Ministry of Railways; the MOC; the MOH and other departments in supervision and management of hazardous chemicals.

##### The list of hazardous chemicals

The hazardous chemicals controlled by the regulations mean all the hazardous chemicals have been in the list of dangerous goods(GB12268); The list of acute chemicals and other hazardous chemicals. Classifications of hazardous chemicals include explosives; compressed gases and liquefied gases; flammable liquids, flammable solids, self-combustibles and flammables when wetted; oxidants and organic peroxides; toxic substances and corrosive substances, etc. According to chemical hazards and toxicities of 12 POPs, they shall be subject to the regulations in China.

##### Examination and approval system of production and storage

The regulations provide that the state practices unified planning, reasonable arrangement of site locations and strict control for production and storage of hazardous

chemicals. The state practices the examination and approval system of production and storage. Without permission, any institution and person must not produce and store hazardous chemicals.

An applicant who wants to produce and store hazardous chemicals shall apply to local Commissions of Economic and Trade (CET) at provinces and cities with some districts and submit information materials provided for and his qualification certificate. The local CETs will organize local experts to examine the information materials and submit them to the local government at same level for approval. The provincial CET or city CET will issue permission certificate to the applicant if the local government approves his application. Then the applicant goes to local department of industry and administration to handle registration and apply to the SAQSIQ for production permit by the permission certificate.

#### Safe Registration System

In order to control production of enterprises of hazardous chemicals, and provide technical and information support for safe management and emergency response, the SAWSS practices the safe registration system against the enterprises producing and storing hazardous chemicals as well as the institutions who use acute chemicals or use such a large amount of hazardous chemicals as to possibly cause major hazard source when an accident happens. At present, the SAWSS is organizing to amend the list of hazardous chemicals and the list of acute chemicals for registration management. Except dioxins/ furans, other 10 POPs are all the hazardous chemicals for safe registration.

The Rules on Registration Management of Hazardous Chemicals promulgated by the SETC in October 2002 provide that registration contents for production enterprises include current situations of an enterprise; capacity, production volume and maximum storage capacity; product quality criteria; identity of new chemicals and identification and evaluation report for unidentified chemicals; the MSDS and safe label of the hazardous chemical as well as emergency call no. of the enterprise.

#### The business and trade permit system

The regulations provide that the state practices the business and trade permit system for hazardous chemicals. The regulations make specific provisions on scope of business and sale, purchase channel, sale record and purchase procedures of acute chemicals, etc. of these enterprises. The Rules on Management Method of Business Trade Permit of hazardous chemicals promulgated by the SETC in October 2002 provide the basic requirements for qualification of enterprises that undertake business and trade of hazardous chemicals.



Classification, labeling and MSDS systems

In order to guarantee safe use of hazardous chemicals, the state practices classification, labeling and MSDS systems of hazardous chemicals. A manufacturer is required to make classification, labels and prepare a MSDS for his hazardous products according to the national standards concerned.

Chinese classification and labeling systems of hazardous chemicals follow the UN system on transport of dangerous goods. The hazard classes and label symbols of 12 POPs in Chinese systems are shown in Table 5.

Table 5 Hazard classes and label symbols of 12 POPs in Chinese systems

POPs name (CAS No.)	UN No.	China dangerous goods No.	China hazard class and labeling No.
aldrin(309-00-2)	2761	61876	Class 6.1 toxic; symbol No.14
dieldrin( 60-57-1)	2761	61127	Class 6.1 toxic; symbol No.13
endrin( 72-20-8)	2761	61127	Class 6.1 toxic; symbol No.13
heptachlor( 76-44-8)	2761	61876	Class 6.1 toxic; symbol No.14
toxaphene( 8001-35-2)	2761	61876	Class 6.1 toxic; symbol No.14
chlordane( 57-74-9)	2996	61877	Class 6.1 toxic; symbol No.15
mirex( 2385-85-5)	2762	61876	Class 6.1 toxic; symbol No.14
HCB( 118-74-1)	2729	61876	Class 6.1 toxic; symbol No.14
DDT( 50-29-3)	2761	61876	Class 6.1 toxic; symbol No.14
PCB( 11097-69-1)	2315	61062	Class 6.1 toxic; symbol No.15
PCDD	no	no	no
PCDF	no	no	no

The Rules on Elimination of Backward Production Capacities, etc.

The List on Eliminating Backward Production Capacities, Processes and Products (the first) (Order No.6) promulgated by the SETC in January 1999 provides that local departments at every level and enterprises concerned should make planning, and take effective measures to eliminate backward production capacities, processes and products on the list within a definite time. These production capacities, processes and products must not be newly established, transferred and adopted. The PCB, chlordane and heptachlor have been listed on the list within the year of 2000.

Afterwards the Ministry of Territory Resource and the SETC jointly issued the Notice on Issuance and Implementation of the Inventory of Banned Supply Land in October 1999. The notice provides that the departments of administration of lands should not accept and review any application for pesticide construction projects of dicofol, lindane,

chlordane, heptachlor, PCB and PCP within a limit period. Local governments at every level should not approve their land occupation plans; the commercial banks must not provide loans to these projects.

#### 4.4.5 Supervision in other links

##### (1) Management of transport

According to the Regulations on Safe Management of Hazardous Chemicals issued by the State Council, the MOC is authorized to supervise transport of hazardous chemicals by road and by waterways. The MOR and the CAAC are authorized to supervise transport of hazardous chemicals by railways and by air, respectively.

The Rules on Transport Management of Dangerous Goods by Railways issued by the MOR in 1995 make specific provisions on package and labeling, consignment and shipment, loading and unloading of dangerous goods. The Rules on Transport Management of Dangerous Goods by Road issued by the MOC in 1993 make specific provisions on package and labeling, consignment and shipment, loading and unloading, fire protection and leakage treatment of dangerous goods. The Rules on Transport Management of Dangerous Goods by Surface Water issued by the MOC in November 1996 also make specific provisions on package and labeling, consignment and shipment, loading and unloading, fire protection and leakage treatment of dangerous goods through internal rivers and harbors.

The CAAC issued the Rules on Transport Management of Dangerous Goods by Air in 1996. The list of hazardous goods transported by air contains about 3,000 commonly used hazardous chemicals.

##### (2) Regulatory management of occupational safety and health

###### *Law on Prevention and treatment of occupational diseases of the PRC*

The Law on Prevention and Treatment of Occupational Diseases of the PRC put into enforce in May 2001. The MOH is authorized by the Law to uniformly supervise enforcement of prevention and treatment of occupational diseases. The other departments under the State Council are responsible for prevention and treatment of occupational diseases within their scope of authorities and functions.

The law provides that workers enjoy the right of occupational health and protection. Employers should provide laborers with good environment and working conditions in accordance with national occupational health standards and hygiene requirements, and take measures to guarantee health protection of laborers. Employers should take the following measures of prevention and treatment of occupational diseases:

- (1) To set up or designate an institution or an organization with full or part-time occupational health professionals to response for prevention and treatment of occupational diseases;
  - (2) To make a plan and implementing scheme for prevention and treatment of diseases;
  - (3) To set up and perfect management system and operation procedures;
  - (4) To set up and perfect occupational health files and health care files for the laborers;
  - (5) To set up and perfect monitoring and assessment systems for hazard factors at work;
- and
- (6) To set up emergency response system for occupational poisoning accidents.

In order to enforce the law, the MOH prepared and issued a series of ministerial rules, such as the Rules on Classification and Management of Occupational Diseases; the Rules on Notification Management of Occupational Hazards; the Rules on Diagnosis and Medical Appraisal of Occupational Diseases; and the Rules on Investigation and Solutions of Occupational Poisoning Accidents.

#### *Regulations on Labor Protection at the Workplace of Use of Toxic Substances*

The State Council promulgated the Regulations on Labor Protection at the Workplace of Use of Toxic Substances in May 2002. Departments of health under governments at above county level are authorized to supervise operations that use toxic substances at work and monitoring and evaluation of occupational poisoning. The regulations provide that except for occupational health requirements provided for by the law of prevention and treatment of occupational diseases, the workplaces that use toxic substances should meet the following requirements:

- (1) The workplaces where nobody is allowed to live should be separated from living places;
- (2) harmful operations should be separated from harmless operations, high toxic operations should be far away from other operations;
- (3) effective ventilation systems should be installed; automatic alarm apparatus and emergency ventilation system should be installed at the workplaces where major leakage risk for a large number of toxic substances or acute poisoning incidents happen;
- (4) emergency withdrawal passageway and necessary discharge areas should be placed at the workplace using high toxic substances. Employers cannot undertake toxic substance operations until their workplaces meet the requirements provided for by the regulations and obtain a permit certificate for occupational safety operation issued by the departments of health.

In order to standardize appraisal work of toxicity of chemicals and guarantee truthfulness and reliability of appraisal conclusions, the MOH formulated the Norms on Management of Appraisal Procedures of Toxicity of Chemicals and Rules on Guidelines

of Laboratory Conditions and Test of Chemical Toxicity (GLP) in 2000. The MOH also promulgated National Standards on Occupational Health (GBZ2-2002) in 2002 that provide maximum allowable concentrations of 329 toxic substances in air at workplaces. The standards have only DDT concentration limit among 12 POPs: 0.2mg/m<sup>3</sup> (TWA).

### (3) Safety and hygiene of food and cosmetics

#### Law on Hygiene of Foods of the PRC

The Law on Hygiene of Foods of the PRC promulgated by the NPC in October 1995 applies to hygiene supervision of enterprises and sanitation facilities producing and selling foods and food additives within the territory of the PRC. The MOH is authorized to enforce supervision of food hygiene in the country. The law provides that it is forbidden to produce and sell foods containing toxic and harmful substances or contaminated by toxic and harmful substances, that possibly have harmful effects on human health.

It is also forbidden to produce and sell the foods as follows:(1) the foods that are processed with non-cooking chemicals; (2) the foods containing food additives that are not permitted by the MOH; (3) the foods containing pesticide residues that exceed maximum allowable limit provided for by the state.

#### Regulations on Hygiene Supervision of Cosmetics

Regulations on Hygiene Supervision of Cosmetics issued by the State Council in November 1989 provide that the state practices hygiene permit certificate system for hygiene supervision of enterprises producing cosmetics. Production enterprises shall apply to the departments of health at provincial governments for hygiene permit certificate. An enterprise cannot undertake production of cosmetics until it obtains a hygiene permit certificate from provincial departments of health. Production enterprises must examine hygiene quality of its product according to the national standards on hygiene of cosmetics and attach marks of “check passed” before their products are put into market. The products that have not passed quality test or been not in accordance with national standards must not be allowed to put into market.

According to the national standards on hygiene of cosmetics issued by the MOH (GB7916-87), 359 banned chemicals including HCB, endrin and DDT are forbidden to use in cosmetic components.

## **4.5 Standards for Environment, Health and Food Hygiene Management**

Chinese government has formulated a series of national and local standards on environmental quality; pollutant discharge limits as well as national standards on safe

management of hazardous chemicals (see the Table4 and Table 4). The control limits of POPs in existing national standards of China are shown in Table 6

Table 6 POPs substance control limits in existing national standards of China

Standard name and code number	POPs substance control limits
Standards on integrated discharge of sewages (GB8978-96)	Maximum allowable discharge concentration for 69 pollutants; chlorobenzenes: 0.2mg/l (Class 1 water body); 0.4mg/l ( class 2 ) ; 1.0mg/l( class 3 ) ; PCP-Na: 5.0mg/l( Class 1 ) ;8.0mg/l( class 2 ) ;10mg/l( class 3 ) ; No control limits for other POPs
Standards on integrated discharge of air emission( GB16297-1996)	33 air pollutants, only chlorobenzenes: 0.5mg/m <sup>3</sup> ( existing sources) ;0.4mg/m <sup>3</sup> ( new sources) ; No control limits for other POPs
Standards on pollution control of PCBs wastes (GB13015-91)	PCB: 0.003mg/l (maximum allowable discharge concentration); pollution limit in soils:50-500mg/kg(the first level); >500mg/kg( the second level)
Standards on pollution control of incineration of hazardous wastes (GB18484-2001)	Performance indicators in incinerators of hazardous wastes: temperature:=1100? retention time : 2.0 sec. Destruction rate:=99.99%; incinerators of PCB wastes: temperature=1200 ? ; retention time:=2.0 sec. destruction rate:=99.9999%; discharge limits for PCDD: 0.5TEQ ng/m <sup>3</sup> ?
Standards on pollution control of storage of hazardous wastes (GB18596-2001)	Location, package and containers, environmental marks
Standards on pollution control of incineration of household refuses (GB18485-2001)	Performance indicators in incinerators of household refuses: temperature=850? , retention time=2 sec.; temperature=1000? , retention time=1 sec.; discharge limits for PCDD: 1.0TEQ ng/m <sup>3</sup> (average)
Standards on quality of fishery water (GB11607-89)	Fishery water body: DDT=0.001mg/l, no control limits for other POPs
Standards on quality of sea water (GB3067-1997)	DDT=0.00005mg/l(class 1 sea areas; DDT=0.0001mg/l( sea areas class 2-4); No control limits for other POPs
Standards on environmental quality of surface water (GHZB1-1999)	Organic concentration limits in three classes: HCB :0.05mg/l; PCB:8.0×10 <sup>-6</sup> mg/l; DDT:0.001mg/l; PCP: 0.00028mg/l? No control limits for other POPs
Standards on environmental quality of soils (GB15618-95)	DDT: =0.05mg/kg(class 1 soils); = 0.50mg/kg(class 2 soils); = 1.0mg/kg(class 3 soils); No control limits for other POPs
Standards on environmental quality of underground water (GB/T14848-1993)	DDT: undetectable(underground water class I); =0.005μ g/l ( class II); =1.0μ g/l( class III and IV); >1.0μ g/l(class V), no control limits for other POPs
Standards on hygiene of drinking water (GB5749-85)	DDT: 1μ g/l; No control limits for other POPs
Standards on pollutants control of DDT and HCH in foods (GB2763-81)	DDT: =0.2mg/kg(grain and tea); = 0.1mg/kg(vegetables, fruits); = 1mg/kg(fish, egg) ; No control limits for other POPs
Standards on hygiene limits of PCBs in seafood (GB9674-88)	PCB=0.2mg/kg(seafood)
Standards on hygiene of Cosmetics (GB7916-87)	359 banned substances in cosmetics, including HCB, Dieldrin and DDT

Standards on occupational exposure limits of harmful factors at work (GBZ 2-2002)	DDT: 0.2mg/m <sup>3</sup> (TWA), no control limits for other POPs
Standards on design and hygiene of industrial enterprises (TJ36-79)	Maximum allowable concentration at workplace: DDT 0.3mg/m <sup>3</sup> , no control limits for other POPs

#### 4.6 Provisions for Public Right to Know and Participation

##### Decisions on Certain Matters of Environmental Protection

The state encourages the public to participate in environmental protection and have a right to know. The State Council promulgated the Decisions on Certain Matters of Environmental Protection in 1996. The decisions point out that environmental protection has important bearing on existence and development of the whole nations, protection of environment is in substance to protect productive enforces. Each region and department should further raise awareness for environmental protection work, strengthen propaganda and education on environmental protection, give wide publicity to environmental sciences and legal knowledge and enhance conscientiously environmental awareness and sense of legal system of all-nations.

Environmental education should be conducted in universities, middle schools and primary schools. It should set up the public participation mechanism and give full play to social organization's role. The public should be encouraged to participate in environmental protection and report violations to environmental laws and regulations.

Newspapers, broadcast and media should timely report and commend advanced examples of environmental protection, openly expose and criticize violation actions of polluting and destroying ecological environment. It should give full play to supervision roles of news media to make the organizations and persons who have caused severe contamination and destruction of ecological environment public.

##### Regulations on safe management of hazardous chemicals

The regulations on Safe Management of Hazardous Chemicals provide that manufacturers of hazardous chemicals shall make labels, marks on the package of their products and provide the MSDS to users of their products according to the national standards. China has formulated national Standards on Preparation of the MSDS of a Chemical (GB16483-2000) referring to the ISO standards.

##### Regulations on Environmental Management of Construction Projects

In addition, the Regulations on Environmental Management of Construction Projects issued by the State council provides that construction institutions shall prepare EIA

reports in accordance with provisions provided for by the regulations and seek opinions from organizations and the citizens who live around the neighborhood.

#### **4.7 Provincial and Local Regulations**

According to the laws and administrative regulations, local people's congresses and governments at above city with some districts level have promulgated local environmental regulations. For example, Beijing city, Shanghai city and Shenzhen city and some provinces, such as Anhui province, Hunan province, Hubei province, Jilin province and Liaoning province have promulgated regulations on environmental protection now.

Tianjin municipal government issued regulations on pollution prevention and control of toxic chemicals in 1999. The local standards on discharge of water pollutants promulgated by the Tianjin municipal EPB provide maximum allowable concentrations of DDT, chlorobenzenes and PCP-Na, etc. in September 1983. Shanghai municipal economic commission and EPB jointly issued the List on Banned and Restricted Hazardous Chemicals in Shanghai City in February 2001. The list contains all the 12 POPs controlled by the convention.

## 5. PRELIMINARY ASSESSMENT ON CURRENT POLICIES/LAWS SYSTEM AND REGULATORY ENFORCEMENT CAPABILITY

### 5.1 Preliminary Assessment on Current Policies/Laws System

As described in above section 4, China has established a legal system on environmental protection and safe management of hazardous chemicals tally with actual situations of the country. China has corresponding competent authorities at the central government and local governments and preliminary enforcement capacities to implement the convention obligations. However, there are some barriers and gaps in the existing policies/laws and enforcement capacities to fulfill the POPs convention obligations (see Table 7).

**Table 7 Preliminary analysis on POPs provisions in existing policies/regulations**

Laws/Policies Contents	Are there any provisions?	Apply to management of POPs? Are there any specific requirements?
<b>Environmental Policies/Guiding Principles</b>		
Environmental policies and framework	Yes	Applicable, but no specific requirements
Sustainable development policy	Yes	Applicable, but no specific requirements
Specific POPs control policies	No	There is no specific requirements
State's commitments to addressing the POPs	No	There is no specific requirements
State strategies and plan for POPs pollution prevention and control	No	There is no specific requirements
<b>Environmental Laws/Regulations</b>		
EIA system	Yes	Applicable and have specific requirements
Air emission control laws	Yes	Applicable, but no specific requirements
Air emission control standards	Yes, but incomplete	Only emission standards for PCDD
Total pollutant load control	Yes, but incomplete	No
PRTR system	No	No
Water pollution control laws	Yes	Applicable, but no specific requirements
Discharge notify and permit license	Yes	Applicable, but no specific requirements
Water pollutant discharge standards	Yes, but incomplete	Applicable, but only have DDT limits
Hazardous waste laws/ regulations	Yes	Applicable and specific requirements
List on hazardous wastes	Yes	Applicable and specific requirements
Report and registration system	Yes	Applicable, but incomplete
Waste manifest system	Yes	Applicable, but no specific requirements
Import/export control	Yes	Applicable and have specific requirements
Contaminated site report and clean-up	No	Applicable, but no specific requirements
POPs waste disposal	Yes, but incomplete	Applicable, but only have PCB control
<b>Laws/regulations on Safe Management of</b>		



Hazardous Chemicals	No	No any specific requirements
Pre-manufacture notification system	Yes	Applicable and have specific requirements
Production examination and approval system	Yes	Applicable and have specific requirements
List of hazardous chemicals and registration	Yes	Applicable, but no specific requirements
Business and trade permit system	Yes	Applicable and have specific requirements
Ban and restrict use system	Yes	Applicable and have specific requirements
Classification, labeling and MSDS	Yes	Applicable and have specific requirements
Transport qualification and license	Yes	Applicable and have specific requirements
Import/export registration and PIC procedures	No definite provisions	No specific requirements
Waste chemicals disposal		
Regulations on Safe Management of Pesticides	Yes	Applicable and have specific requirements
Pesticide registration system	Yes	Applicable and have specific requirements
Production permit system	Yes	Applicable, but incomplete
Product quality standards	Yes	Applicable, but incomplete
Safe use and elimination system	Yes	Applicable and have specific requirements
Package and label system	Yes	Applicable and have specific requirements
Import/export control and PIC procedures		
Other Regulations Concerned		
Occupational safety and health regulations	Yes	Applicable, but no specific requirements
Regulations on foods and hygiene	Yes	Applicable, but no specific requirements
Environment and Health Standards		
Environmental quality standards	Yes	Applicable, but incomplete
POPs identification standards	No	No
Occupation health standards	Yes	Applicable, but only have DDT limits
Public Right to Know and Participation		
Specific regulations	No	But have some provisions in regulations
PRTR system	No	No
Chemical information database systems	Yes	Yes, but not many
Governmental bulletins on environment	Yes	Applicable, but no specific data
Internet websites	Yes	Yes, but not many

### (1) Preliminary assessment on regulations/policies of POPs pesticides

It can be noticed from the section 4 that Chinese government supervises production, use and import/export of 9 POPs pesticides through the pesticide registration systems, etc in accordance with the Regulations on Management of Pesticides. Among 9 POPs pesticides, five POPs (aldrin, dieldrin, endrin, heptachlor and mirex) have never been registered and forbidden in production and use. Pesticide registrations of toxaphene and

chlordane were cancelled in 1996. Their production and use have been forbidden under the regulations. The HCB has never been approved for pesticide registration and agricultural use and is used as an intermediate for production of the PCP- sodium. DDT is the only pesticide that has been approved for pesticide registration, and allowed to be used as an intermediate for production of dicofol, and for malarial control and export.

Because of serious termite troubles in the southern China, there are no economic/effective alternative products and effective supervision and coordinative control measures, illegal production and use of chlordane and mirex still exist although their registration and use are not approved.

The preliminary analysis results on barriers and gaps in the existing pesticide policies/laws and enforcement capacities to fulfill the POPs convention obligations are shown in Table 8.

Table 8 Preliminary analysis results on barriers and gaps in existing pesticide policies/regulations

Obligations provided for by the convention	Can laws/policies meet requirements?	Remarks and analysis for needs
Prohibit and /or take the legal and administrative measures to eliminate its production and use of the chemicals listed in Annex A (Article 3. 1a)	Production and use of 8 POPs pesticides (aldrin, etc) have been prohibited or restricted by the regulations. HCB is not approved for pesticide; it is only used as an intermediate for production of PCP. Production and use of chlordane and mirex cannot be controlled effectively.	Illegal production and use may be controlled by means of three ways: Strengthening regulatory management; policy and alternatives/ technologies. Production of HCB as intermediate needs to take measures of prevention pollution, such as adopt a closed process and reduce impurities of PCDD in PCP-sodium product.
Restrict its production and use of DDT listed in Annex B (Article 3. 1b)	Agricultural use of DDT has been prohibited by the regulations, the only uses are to produce dicofol, and for malarial control and export. Its production and use can be basically controlled by the regulations	It needs to evaluate and study how to phase out production and use of DDT step by step, and control high DDT residues in dicofol product.
Each party shall take measures to ensure: that a chemical listed in Annex A or B is imported /exported only for the purpose of environmentally sound disposal or for a use permitted by the convention (Article 3. 2a-c)	Except mirex, import/ export of other 8 POPs has been controlled by implementation of PIC procedures. Import/ export of mirex has not been effectively controlled by current regulations	It needs to perfect and add the control list and put mirex into the list, and study how to control transboundary movement.
Take measures under existing	Import and production of new	It needs to research and evaluate

regulatory and schemes to prevent the production and use of new pesticides and industrial chemicals exhibiting the characteristics of POPs and take the criteria for identification of POPs into consideration in such schemes (Article 3.3, 3.4)	pesticide have established registration and evaluation mechanism, but no identify standards for the POPs; There is no pre-manufacture notification system for new industrial chemicals established.	how to take proper measures to prevent new pesticide and industrial chemicals with POPs characteristics from into market and use, establish and perfect notification and evaluation mechanism, identification standards
Manage POPs stockpiles and wastes in a manner protective of human health and the environment including developing strategies for their identification, and application of environmentally sound handling, collection, transport, storage and disposal measures(Article 6.1)	Storage, transport and safe handling of hazardous chemicals have been covered by current regulations, but there are no provisions on report and identification system for POPs sources, storage facilities of POPs wastes and contaminated sites .	It needs to research and formulate technical policies and strategies for POPs pollution prevention and management
Take appropriate measures to prohibit disposal of POPs stockpiles and wastes leading to recovery, recycling, reclamation and direct use or alternative use (Article 6.1)	There is no definite provisions on this subject	The state encourages to reuse and recycling of industrial wastes. This policy is contradictory with the requirements of the convention. It needs to study how to prohibit and control recovery and recycling of waste POPs pesticides.
Regulate transboundary movement of POPs stockpiles and waste POPs in accordance with international rules, standards and guidelines(Article 6.1d)	There are definite provisions on import/export and transboundary shipment of hazardous wastes in the regulations	It needs to research how to prohibit and control effectively transboundary movements of POPs wastes
Promote and facilitate awareness among its policy and decision makers with regard to POPs; development and implementation of educational and public awareness programs on POPs and training(Article 10)	There are general provisions on public participation and environmental education, but shortage of definite measures and operation mechanism in the regulations	It needs to evaluate efficacy of operation mechanism of regulations/policies, and research how to raise awareness of decision makers and strengthen enforcement capacity
Parties may use MSDS, reports, mass media and may establish information centers at national and regional levels to collect, and provide information on POPs and their alternatives	There are no specific provisions on collection, evaluation, report and dissemination of POPs information in the regulations. The PRTR system has not been established in China.	It needs to research and evaluate how to integrate the collection, dissemination and management system of POPs information into the existing environmental monitoring and information management system

(Article 10.4)		
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## (2) Preliminary assessment on regulations/policies of PCB

As described in section 4 of the report, Chinese government has promulgated a series of regulations and ministerial rules, technical policies and standards to supervise and control production, use, import/export of PCB and collection, storage, incineration and disposal of hazardous wastes containing PCB. China completely stopped production of PCB from the beginning of 1970'. China also stopped import of PCB electric equipment from 1979. The SEPA promulgated the Regulations on Prevention of Environmental Pollution of Electric Equipment Containing PCB and its Wastes that provide collection, storage, transport, disposal and import/export of PCB and electric equipment containing PCB. The SEPA also organized preliminary investigation activities on use of PCB equipment and disposal of PCB wastes in the country. The regulations, technical policies and pollution control standards of hazardous wastes have been completed progressively since promulgation of the Law on Solid Waste Pollution Prevention and Control Of the PRC in 1995.

The preliminary analysis results on barriers and gaps in the existing PCB policies/laws and enforcement capacities to fulfill the POPs convention obligations are shown in Table 9.

Table 9 Preliminary analysis results on barriers and gaps in existing PCB policies/regulations

Obligations provided for by the convention	Can laws/policies meet requirements?	Remarks and analysis for needs
Prohibit and /or take the legal and administrative measures to eliminate its production and use of the PCB listed in Annex A (Article 3. 1a)	Production and use of PCB have been forbidden by regulations. The regulations provide collection, storage, transport, disposal and import/export of PCB and electric equipment containing PCB, except use in paint s and inks.	It needs to evaluate current situations of PCB equipment at use; safe storage of temporarily abandoned PCB equipment; identify sealed sites of PCB equipment; and dispose contaminated sites and PCB wastes in an environmentally sound manner.
Take measures to ensure PCB and its electrical equipment is imported /exported only for the purpose of environmentally sound disposal (Article 3.2 and Annex A Part II)	The regulations prohibit import and export of electric equipment containing PCB	It needs to evaluate efficacy of enforcement procedures and raise abilities of enforcement personnel

Take proper actions by 2025 to identify, label and remove from use equipment containing greater than 0.05% PCB and volumes greater than 5litres(Annex A Part II)	The regulations have no specific provisions on identification and label and removal from use equipment containing PCB	There are no report, registration and information update systems for PCB equipment used in the electric power industry, etc. It needs to formulate investigation, audit and files methodology.
Promote the measures to reduce exposures and risk to control the use of PCB: not use in areas of production or processing of food or feed; Restrict use in populated areas, such as schools and hospitals (Annex A Part II).	The regulations have no specific provisions on location and removal of equipment containing PCB	It needs to investigate removal and transfer of PCB equipment at existing sources and its pollution prevention measures.
Make efforts to lead to environmentally sound waste management of PCB liquids and equipment (content above 0.005% as soon as possible but no later than 2028 (Annex A Part II).	The regulations provide collection, storage, transport, disposal and import/export of PCB and electric equipment containing PCB, but the provisions need to be supplemented	There are no registration, pollution monitoring and maintenance systems established at temporarily sealed sites. It needs to prepare the guideline on environmentally sound management of PCB wastes.

### (3) Preliminary assessment on regulations/policies of the PCDD/PCDF

As described in section 4 of the report, the SEPA promulgated the List of Hazardous Wastes that covers wastes containing the PCDD/PCDF in January 1998. In addition, the SEPA also promulgated the national standards on pollution control of incineration of hazardous wastes as well as standards on pollution control of incineration of household refuses. The two standards provide maximum allowable discharge limits of the PCDD in flue gases from incinerators.

However, there are no specific pollution control provisions in the national policies on industrial development, the technical policies on pollution prevention and control and the environmental regulations now, because source categories of the PCDD/PCDF generated unintentionally from waste incinerators, production of pulp using chlorine, thermal processes in the metallurgical industry and production of Chlorophenols, etc. pollution hazards and pollution control measures of the PCDD/PCDF have not been identified in China. The national standards on pollution control of the PCDD from incinerators have

not actually enforced because of shortage of monitoring capacities in the existing laboratories in the country.

The preliminary analysis results on barriers and gaps in the existing policies/laws related to the PCDD/PCDF and enforcement capacities to fulfill the POPs convention obligations are shown in Table 10.

Table 10 Preliminary analysis results on barriers and gaps  
in existing policies/regulations related to the PCDD/PCDF

Obligations provided for by the convention	Can laws/policies meet requirements?	Remarks and analysis for needs
Develop and implement an action plan to identify, characterize and address the release of the chemicals listed in Annex C (Article 5.a)	The policies/ regulations have no specific requirements for identification, and characterization of PCDD	Environmentally sound management of unintentionally generated PCDD/PCDF is still at beginning stage. It cannot be done to formulate NIP until all the sources and release quantities are identified.
Take an evaluation of current and projected release; efficacy of the laws and policies; steps to promote education and training of these strategies (Article 5.a)	The existing regulations have no specific requirements on this subject.	Environmentally sound management of unintentionally generated PCDD/PCDF is still at beginning stage. As the first step, it needs to prepare the guidance manual on PCDD/PCDF inventory investigation and report provisions and training work.
Promote application and development of release reduction or source elimination, and require use of substitutes, etc (Article 5.b.c)	The existing regulations have no specific requirements on this subject.	Probably ,it needs to prepare guidelines for pollutant source monitoring, pollution control standards and environmentally sound management, etc.
Promote and require the use of the BAT for new sources; promote the use of the BAT and the BEP for the source categories listed in Part II or Part III of Annex C (Article 5.d,e)	The existing regulations have no specific requirements on this subject.	Probably ,it needs to prepare guidelines for optimum control of production processes of PCDD sources and the BAT and the BEP, etc.

## 5.2 Preliminary Assessment on Regulatory Enforcement Capacity

In order to fulfill the POPs convention obligations, the following barriers in regulatory enforcement capacities of Chinese competent authorities should be solved:

- (1) Shortage of effective inter-agency coordinating mechanisms for POPs supervision

Environmentally sound management of hazardous chemicals and pesticides are enforced by many ministries under the State Council jointly in China. For example, supervision procedures for a pesticide are as follows: at first, the MOA is responsible for examination of application and issuance of pesticide registration certificate, then the SAQSIG or the SETC review and issue the production license, at the third step, the SAWSS examine and issue the business and trade permit; one by one the QTSB for examination of production quality; the department of industry and administration in charge for supervision of market sale of product; the MOH in charge of supervision of first aid of poisoning; at last the SEPA is responsible for pollution prevention and control. This supervision mechanism results in more ministerial regulations and rules, unnecessary repetition and overlapping of administration, low efficiency and short of coordination.

For example, according to the Regulations on Management of Pesticides, any institution and person must not produce, sell, import or use a pesticide without registration and production license. However, in the implementation of the regulations, the MOA is failed to enforce the regulations effectively, the Ministry of Construction provides that the persistent period of a pesticide for termite control must not be less than 15 years beginning from the date of completion and acceptance. The ministerial rules invented an excuse for illegal production and use of chlordane and mirex. The incoordination of policies and administration is one of the reasons why the Regulations on Management of Pesticides cannot be effectively performed. Therefore, it is necessary to set up effective inter-agency coordinating mechanisms for POPs supervision headed by the SEPA in order to uniformly formulate national and local guiding principles, policies, planning and strategies for POPs control, coordinate control actions and information communication as well as fulfill obligations on report of enforcement of the NIP.

(2) Regulatory enforcement capacities of competent authorities at different levels need to enhance

Chinese government has promulgated a series of environmental laws and regulations to supervise safety and environmental protection of hazardous chemicals including POPs, but insufficient regulatory enforcement capacities of competent departments result in many regulations cannot be effectively enforced, especially at local city and county levels. The reasons why insufficient regulatory enforcement capacities are that long management links for production, sale, use, import/export and pollution control of hazardous chemicals, legal enforcement understaffed, short of monitoring instruments and inadequate experience and training.

For instance, the state has strictly prohibited production and use of some pesticides

with high toxicity and residues, such as fluoroacetamide, tetramine, chlordane and mirex, but these pesticides can still be bought in local agricultural products markets so that person poisoning, death and pollution of the environment often happen. The reasons for insufficient regulatory enforcement are as follows: firstly, low awareness for potential hazards of POPs.

Production and use of POPs products at large scale were concentrated in 1970' and 1980'. At present, only DDT and HCB are still being produced, but their use has been forbidden. Most people do not hear about them and know little about their hazards. Use of chlordane and mirex is only involved in a few sectors and small areas, such as the house construction, dykes and dams protection. Production and use of PCB also were concentrated in the period of 1965 to 1981. Its use has fully terminated to use since then. Abandoned PCB electric equipment was sent to seal up for safekeeping, it seems that people have forgotten them. General people know very little about the production mechanism, hazards and pollution control means of unintentional production PCDD/PCDF. How to prevent and control pollution from PCDD/PCDF have not placed on the agenda that the government concerns and discusses.

China is a developing country. Many people at local areas face low living standards and need to solve social warmness and foods problems through economy development, especially unemployment rate increases during the present economic and structural reform of the state-owned enterprises. Considering economic benefits and other factors, some officials of local governments may relax restrictions so that control of POPs cannot meet requirements provided for by the regulations.

For example, the Order 6 issued by the SETC in January 1999 provides that chlordane and PCB are products eliminated at once. Every region and department and enterprises concerned should make planning and take effective measures to eliminate these products within a definite time. However, local departments do not effectively enforce and supervise these requirements. Some enterprises producing chlordane and mirex have obtained business licenses from the local administrations of industry and commerce and continue their production activities with the tacit consent of competent departments, because they can make industrial output values and profits for local governments.

Therefore, it is an imperative problem that governmental officials' awareness on hazards of POPs and enforcement capacity should be enhanced, and effective supervision mechanisms should be set up.

Secondly, there are shortage of definite policies on pollution control of POPs, management norms and guidelines. At present, in safe management of hazardous



chemicals, the SAWSS put the stress on preventing and controlling hazardous chemicals with flammable, explosive and acute toxic characteristics from explosion, fire, leakage and poisoning accidents. The emphasis of national pollution prevention and control is still placed on preventing and controlling the primary generation pollutions caused by air emissions, wastewater and solid wastes discharged from industrial productions. The key environmental pollutants that the state requires to control include acid rains caused by sulfur dioxides, suspended particles, tail gases from automobiles in air pollution control fields; discharge of COD, organic water pollutants and heavy metal pollutants, etc from industrial sources; treatment and disposal of municipal refuses and industrial solid wastes, etc. The state has not formulated effective policies and countermeasures and is short of necessary supervision and assessment means for the secondary and the tertiary generation pollutions caused by use of hazardous chemicals and treatment and disposal of waste chemicals after use.

China did not conduct comprehensive investigation and monitoring activities on where DDT, HCB and PCB produced and used historically have gone and the present situations of pollution caused by them. China has no basic information about source categories, pollution hazards, prevention and control ways of the unintentional production PCDD/PCDF. The state has not formulated specific environmental regulations, standards, guidelines and norms on pollution prevention and control of PCDD/PCDF.

The environmentally sound management system construction has been at beginning stage in China now. The state has not established environmental risk assessment and risk management system and technical guidelines in accordance with international standards and practices. There are no the PRTR system and sufficient monitoring and analysis capacity of laboratories as well as proper expert support system for risk management of chemicals in China. It is imperative task to perfect environmental regulations and standards, formulate policies and guidelines on pollution prevention and control of POPs to strengthen regulatory enforcement capacity construction.

The third, the legal enforcement officials are short of necessary training. Insufficiently experienced and well-trained management personnel and professionals present a limiting factor for effective control hazardous chemicals and hazardous wastes.

Since structural reform of central government and local governments in 1998, staffs have been reduced and a lot of management posts have been changed in governmental bodies at different level. Change of management officials has impact on continuance of management work. For example, there are insubstantial human resources and no one person specially assigned for management of toxic chemicals and hazardous wastes in the divisions of pollution control of provincial, city and local EPB in the country. This situation presents a limiting factor for effective control hazardous chemicals and

hazardous wastes.

There are less than 200 management staffs in agrochemical control institutions under provincial, autonomous region and municipalities directly under the central government in the country now. More differences of management level and unfamiliar

with regulations and management procedures have impact on enforcement of the regulations and pesticide registration work. Therefore, it is necessary to conduct technical training at all levels to raise their awareness to POPs, and regulatory enforcement capability.

(3) Shortage of management support system in charge of information collection, report and assessment

Many developed countries have established and implemented the pollutant release and transfer register (PRTR) system and the MSDS system to provide the authorities and the public with access to current information on toxic chemicals including POPs. These systems are beneficial both for the officials to control environmental pollution caused by toxic chemicals and for the public to know and participate in pollution prevention. China has not established the PRTR system now. The competent departments' supervisory actions against POPs are restricted because of badly informed of POPs and short of expert support system in charge of information collection and assessment.

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## **Appendix 5:**

### ***Primary Review Report on China's POPs Stakeholders***

Unedited draft English text of final report in Chinese

CRC-SEPA  
Dec. 2002

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## 1. Preface

*Stockholm Convention on the Persisted Organic Pollutants*(Stockholm Convention for short)requests all the contracted partners should draw national implementing plans(NIP)within 2 years after it takes in effect. China signed Stockholm Convention On May 23<sup>rd</sup> in 2001, and the authorizing procedures are ongoing. Sponsored by GEF, *Preliminary assessment to identify the requirements for developing a National Implementation Plan in the People's Republic of China as a first step to implement the Stockholm Convention on POPs* executed by the United National Industrial Development Organization (UNIDO) was approved on December 20<sup>th</sup> in 2001.

The purpose of the sub-project *National Consult on Institutions Concerning POPs Management* is to identify the possible stakeholders and to make comments on them, finally to put forward prior projects on capacity building in NIP compilation.

The stakeholders concerning Stockholm Convention was identified as state, provincial/municipal governments, industrial enterprises, analytical and testing labs, researching institutes, law-enforcement agencies, public health organizations, NGOs and other close relevant social groups.

This project report was completed by means of disseminating questionnaires, searching websites, reading references, attending meetings, consulting experts, and so on.

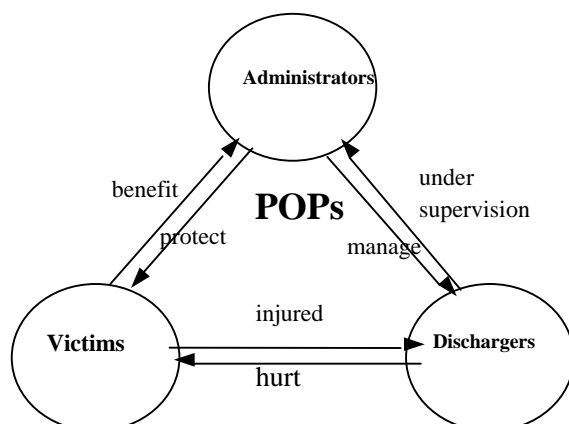
The report comprises four parts: The first one is preface. The second part gives a holistic picture about those stakeholders concerning Stockholm Convention. The challenges and problems may be raised while fulfilling the Convention is analyzed in the third part. Prior projects and their cost assessment required in the NIP development was put forward in the fourth part. The first three parts of the report were completed by Ms. ZHOU Hong from Chemicals Registration Center of SEPA. The fourth part was completed by professor LI Zhengyu from Beijing Research Institute of Petroleum & Chemical industry.

The report is one of the five research outcomes expected by the project job description. The others are: *The Preliminary National Stakeholder Digital Directory*; *The Preliminary National POPs Laboratories Digital Directory*; *Primary Review Report on China's POPs Laboratories*; *Report on the Priority Projects in China for POPs Monitoring and Analysis*.

## 2. Review of Involved Parties

Three parties are directly involved in the course of fulfilling the Convention to reduce and eliminate man-made discharge of POPs, which include pollutants dischargers, pollution victims, and supervisors/protectors. Meanwhile, diplomatic organization, macro-regulation and financial organs, technical supporting organs and popularizing and training organizations are also involved in.

## Direct involved parts



## Indirectly involved parts

- Diplomatic organization
- Macro-regulation and financial organs
- Technical support organs
- Popularizing and training organs

**Chart 1 POPs involved parties**

It must be notified that the same organs may have dual-identities. Dischargers often are pollution victims. This chart and this report only shows their major identities.

The seven parties involved in China fulfilling Stockholm Convention are reviewed as follows.

### 2.1. Supervision Organs

#### 2.1.1. Brief Introduction of China's Administrative System and Government Agencies

China's State Administrations include:

State power organ---National People's Congress and local People's Congress

President of the People's Republic of China

State Administrative Organs----State Council and its local branches

State Leading Military Affair Organ-----Central Military Commission

State Judgment organ-----Supreme People's Court, its Local People's Court and Special People's Court

State Procuratorate Organ-----Supreme People's Procuratorate, Local People's Procuratorate and Special People's Procuratorate

#### ? National People's Congress (NPC)

The NPC is the highest organ of state power in PRC. It exercises legislative power; decides major issues in national life; elects and decides on the choice of leading personnel of the highest state organs, i.e., elects the members of the Standing Committee of the NPC, the state president and vice-president, decides on the premier and other members of the State Council, and elects the chairman and other members of the Central Military Commission, the president of the Supreme People's Court, and the procurator-general of the Supreme People's Procuratorate.

The NPC is elected for a term of five years. It usually meets once a year. When the NPC is not in session its Standing Committee exercises state power. The NPC Standing Committee is composed of a chairman, several vice-chairmen, a secretary-general and additional members.

### ? President of the People’s Republic of China

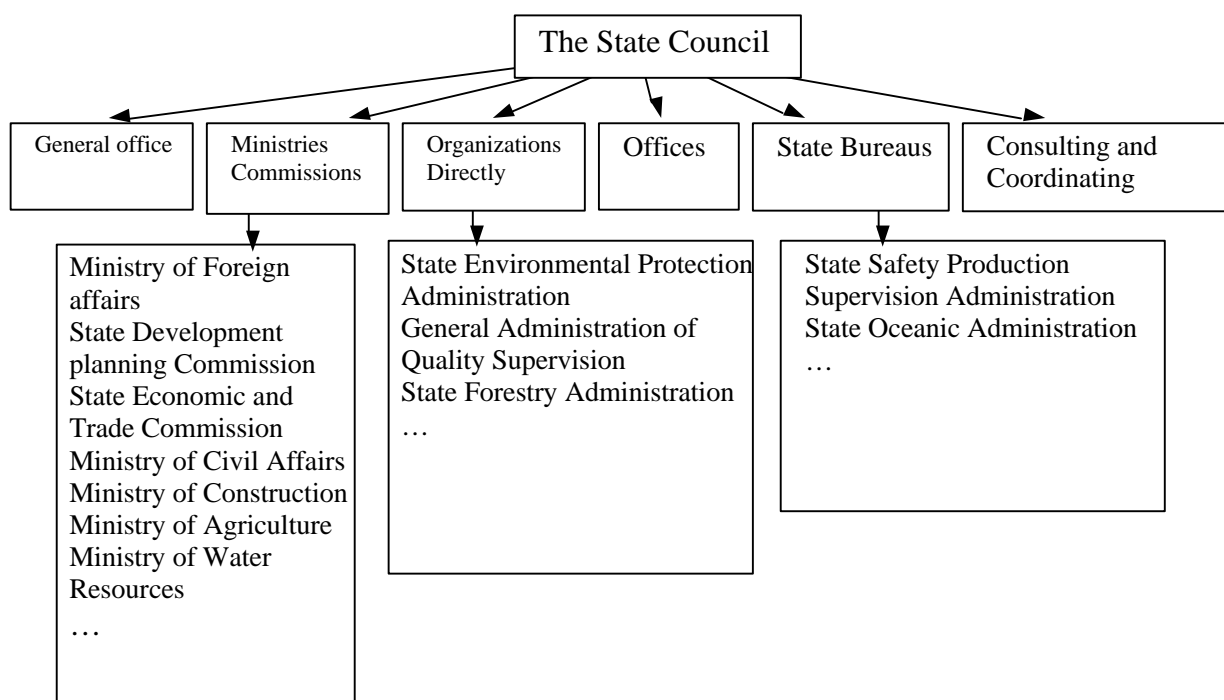
The president, in pursuance of decisions of the NPC or its Standing Committee, promulgates laws, appoints and removes members of the State Council, issues orders, receives foreign diplomatic representatives on behalf of the PRC, dispatches and recalls plenipotentiary representatives abroad, and ratifies and abrogates treaties and important agreements reached with foreign states.

### ? The State Council

The State Council, the Central People’s Government, is the highest state administrative body. The State Council is composed of the premier, vice-premiers, state councillors, the heads of the various ministries and commissions, the auditor-general and the secretary-general. The State Council carries out the laws enacted and decisions adopted by the NPC and its Standing Committee. The State Council is responsible to the NPC and its Standing Committee, and reports to them on its work. The State Council exercises the following functions and powers under its jurisdiction: formulates administrative measures, enacts administrative regulations, promulgates decisions and orders.

According to organization law, the framework of the State Council includes General Office of the State Council, Ministries & Commissions of the State Council, Organizations Directly Under the State Council, Offices under the State Council, State Bureaus Under the Jurisdiction of Ministries or Commissions, Consulting and Coordinating Organs and temporary organs, etc. (chart 2)

Ministries & Commissions of the State Council, including Ministries, Commissions, People’s Bank of China and National Audit Office, perform separately the basic administration function of the State Council according the laws. Organizations Directly Under the State Council charge special operations of the State Council and have independent administration function. Offices under the State Council assist premier to complete special proceeding and have not independent administration function. State Bureaus Under the Jurisdiction of Ministries or Commissions charge given operations and have the power of administration. Consulting and Coordinating Organs take organizing and coordinating work of important operations of the State Council’s organs in hand. Corresponding organs will perform their discussed conclusions approved by the State Council. Temporary administrative acts can be regulated under special conditions approved by the State Council.



**Chart 2 Framework of the State Council**



**? Local People's Congresses and Local People's Governments**

China's administrative function division generally has three levels: provinces (autonomous regions, municipalities under central authority), counties (autonomous counties and cities), and towns. But there are four levels in autonomous districts and districts and counties led by cities.



**Chapter 3 Administrative Regions in China**

**Table 1 All Level Administrative Regions in China**

All levels	Number
Provinces	345 (autonomous regions, 4 municipalities, 2 special administrative region)
Autonomous districts (Municipalities with districts)	About 300 (30 autonomous districts? 265 Municipalities with districts)
Counties	Over 2800
Towns	Over 40000

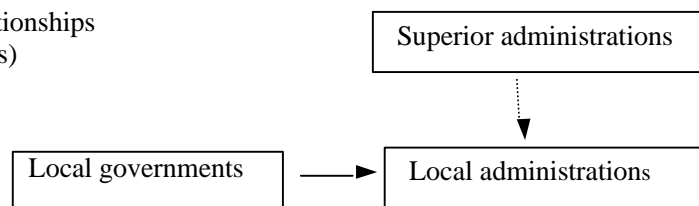
Local people's congresses are the local organs of state power. They have the power to decide on important local affairs in their respective administrative areas. The people's congresses of provinces, autonomous regions and municipalities directly under the Central Government have the power to formulate local laws and regulations.

Local people's governments are local administrative organs of the state. Counties and above can set down rules according to the higher-level laws.

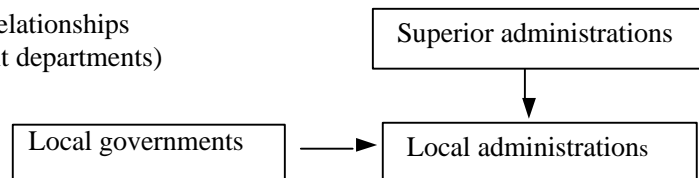
Governments at County level or above set up necessary departments according to their functions. The departments at provinces level are office.

There are three kinds of relationship between local administrations and superior administrations: 1. Instruction relationship. i.e., Local administrations led by local governments and instructed by superior administrations. 2. Dual-leaderships. i.e., Local administrations led both by local governments and by superior administrations. Discipline, audit departments belong to this relationship. 3. Upright leading relationship. i.e., Local administrations only led by the center administrations and local government is responsible for supervision. Such as the Center Bank and the Customs.

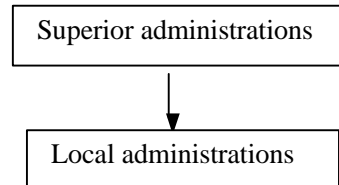
I. Instruction relationships  
(most departments)



II. Dual-leading relationships  
(supervision, audit departments)



III. Upright leading relationship  
(the Center Bank, Customs)



**Chart 4 The Relationship Between Local Administrations and Superior Administrations**

**2.1.2. The Management Framework Concerning POPs in China**

Administrations involved in fulfilling Stockholm Convention include comprehensive management organizations, organizations concerning the use of POPs or POPs-related byproducts, and other organizations like diplomatic agencies, macro-regulation agencies and Science & Technology management agencies.(table 2)?

**Table 2. Functions of administration organs and POPs related**

Administration organs		Functions	Related POPs		
			POPs pesticides	PCBs	Dioxin /furan
<b>Integrat- ed monitor- ing and coordinat- ing organs</b>	<b>State Environme- ntal Protection Administra- tion</b>	Pollution integrated control, link site for Stockholm Convention	X	X	X
		Solid wastes prevention and treatment	X	X	X(wastes treatment)
		Air pollution prevention and treatment	X	X	X(Vehicle discharge, plants burning)
		Dangerous chemicals import and export registration	X	X	
<b>major Admin- istrative organs</b>	<b>State Economic and Trading Commission</b>	Industry policies, clean production	X	X	X(Discharges of industries like metallurgy, energy, Petroleum and Chemical, building materials, textile, paper making)
		Working safety(registration of producing, storage, and use)	X		
	<b>Ministry of Agriculture</b>	Pesticides management (pre-production registration, safety management, and registration of import and export pesticides)	X		
		Rural construction (straw comprehensive utilization)			X (plants burning)
	<b>Ministry of Health</b>	Health monitoring and management (occupational health, food health, environmental sanitation)	X	X	X
		Diseases control	X(DDT)		X(PCP)
	<b>General Administration of Quality Supervision, Inspection and Quarantine</b>	Quality management (production permission for industrial products, Quality spot test), national standards, accreditation	X	X	X

<b>related Administration organs</b>	<b>Ministry of Construction</b>	House construction	X (chlordane, Mirex)		
		City road construction			X (pitch mixing)
		Household wastes treatment			X (household wastes treatment)
	<b>Ministry of Water Resources</b>	Water resources protection	X	X	X
		Hydro-facilities construction	X (chlordane, Mirex)		
	<b>State Oceanic Administration</b>	Oceanic environment protection	X	X	X
	<b>Ministry of Communications</b>	Road construction	X (chlordane, Mirex)		X (pitch mixing)
	<b>Ministry of Railways</b>	Railway construction			X (PCP)
	<b>Ministry of Civil Affairs</b>	Funeral and interment			X (cremation)
<b>State Forestry Administration</b>	Forest fire prevention			X (plants burning)	
<b>Diplomatic, macro regulation and Science &amp; Technology management</b>	<b>Ministry of Foreign Affairs</b>				
	<b>State Development Planning Commission</b>				
	<b>Ministry of Finance</b>				
	<b>Ministry of Science &amp; Technology</b>				

### ? Comprehensive Supervision Organs

SEPA, a ministerial-level authority directly under the State Council, oversees national environmental protection efforts. SEPA comprehensively supervises and controls POPs pollutants by preventing and controlling pollution discharges. The coordinating role of SEPA on POPs control is significant.

### ? Major Administration Organs

State Economic and Trade Commission, directly under the State Council, is responsible for macro regulation of the national economy. The main functions include industrial managements for metallurgy, Petroleum and Chemical and building materials, etc. The commission takes an important role on preventing and reducing POPs.

Ministry of Agriculture, directly under the State Council, charges agriculture and rural development and its main functions are POPs pesticide management.

Ministry of Health, directly under the State Council, charges health work and maybe use POPs pesticides such as DDT and PCP, and supervises and manages POPs in occupational safety, food security and sanitation as well.

General Administration of Quality Supervision, Inspection and Quarantine, directly under the State Council, charges national quality, measure, inspection of export and import goods, quarantine of export and import sanitation, quarantine of export and import propagation, certification and standardization, etc. The General Administration supervise and control POPs by criteria establishing, certificating and quality inspection.

### ? **Related Administration Organs**

Ministry of Construction, Water Resources, Communications and Railways are the managers of the use of chlordane, DDT, mirex or PCPs, and Ministry of Construction, Communications, Civil Affairs and Forestry are the managers of POPs as byproduct from pitch mixing, body burning and forestry fire. Meanwhile, Ministry of Water Resources and State Oceanic Administration take separately charge in water protection and ocean environment protection. All of these agencies can reduce POPs emission by taking POPs control measures, using substitutes, etc.

### ? **Diplomatic, Macro-regulation and Science & Technology Management Organs**

Ministry of Foreign Affairs, State Development Planning Commission, Ministry of Finance and Ministry of Science & Technology will take great role on China fulfilling *Stockholm Convention*.

### **2.1.3. State Administration Organs**

#### **2.1.3.1. Pollution Comprehensive Supervision and Coordination Organs**

#### ? **State Environmental Protection Administration**

SEPA, a ministerial-level authority directly under the State Council, oversees national environmental protection efforts.

SEPA is the leading organ of Chinese negotiation delegation for Stockholm Convention and the state link site of the Convention. It is also the Administration in charge and the state link site of Basel Convention and Rotterdam Convention.

Its main responsibilities are as follows:

- (a) To devise the national policy, laws and administrative regulations for the environmental impact assessment of major economic and technological policies, development planning and key economic development plans and to formulate the national environmental protection plans; to formulate and monitor the implementation of the national plan for pollution control and ecological conservation in key regions and river basins.
- (b) To devise and organize the enforcement of the laws and regulations for prevention of atmosphere, water, soil, solid wastes, poisonous chemicals and vehicle exhausts; to supervise, coordinate and monitor the protection of the marine environment.
- (c) To establish the national standards for environmental quality and for pollutants emission and discharge and launch them according to the relevant procedure; be responsible for filing of local environmental standards; to organize the compilation and submission of the national report on the environmental quality and the issuance of the national report on the state of the environment and to release on a regular basis the report of the environment quality of key cities and river basins; and to participate in the development of national program for sustainable development.
- (d) To formulate and organize the implementation of various regulations of environmental management; to examine and approve the report of environmental impact assessment for the development and construction activities as required by the relevant regulation; to supervise the urban and rural ecological environmental conservation and supervise the construction of national ecological demonstration areas and the eco-agriculture.

(e) To be responsible for the environmental monitoring , statistics and information collection; to formulate the rule, regulation and specification for the environmental monitoring ; to organize the construction and management of the national network of environmental monitoring and of environmental information; to organize the monitoring of the environmental quality and the supervisory monitoring of the pollution sources at the national level; to organize, supervise and coordinate the environmental education, publicity and publication and to promote the participation of the public and non-governmental organizations in the environmental protection.

(f) To establish the national principles for addressing the global environmental issues; to manage the international cooperation for the environmental protection; to participate in the coordination of important international environmental activities; to participate in the negotiation of the multilateral environmental agreements; to manage and coordinate as the national focal point the domestic implementation of the multilateral environmental agreements; to manage the international economic cooperation in the environmental field.

According to *Ordinance of Dangerous Chemicals Safety Management*, SEPA is responsible for supervising and managing disposal of waste or dangerous chemicals; for investigating pollution accidents of serious dangerous chemicals and ecology-destroyed affairs; for emergently monitoring the spot of poisonous chemicals accidents and registering exported dangerous chemicals

**On comprehensive management of pollution control:** At present, the main laws and regulations on pollution prevention and treatment being supervised and enforced by SEPA include *Environment Protection Law, Air Pollution Prevention and Cure Law, Water Pollution Prevention and Cure Law, Ocean Environment Protection Law, Solid Wastes Pollution Prevention and Treatment Law*, and *Regulation for Environment Protection of Construction Projects*.

Environmental impact assessment system of construction projects and pollutants discharge permission system has been established by the SEPA, and clean production and ISO14000 have been extended in the same time.

SEPA have set up a series of environment standards concerning environment quality, pollutants discharge, and wastes disposal, etc.

**On import and export of POPs:** according to *regulation for chemicals imported for the first time and poisonous chemicals import and export environment management*, the SEPA examines, approves, registers, supervise and manage poisonous chemicals and their import and export for environment protection. Chemicals in the lists include 9 kinds of POPs: aldrine, dieldrin, endrin, Heptachlor, hexchlorobinzene, chlordane, DDT? Toxaphene, PCBs, Meanwhile, PIC program will be performed for import and export of DDT according to *Rotterdam Convention*.

**On POPs-related Wastes:** 12 species of wastes with POPs have been listed in the directory of national dangerous wastes. SEPA, along with other related agencies, strengthens wastes control efforts and have establish a series of regulations and standards such as *Technological Policies for Dangerous Wastes Pollution Prevention and Treatment, Regulations for Dangerous Wastes Diversion Management, Regulation of Dangerous Wastes Utilization Permission, Temporary Ordinance for Environment Protection Management of Import Waste, Control Criterion for Import Wastes (trial), Regulation for Pollution Prevention of POPs-Contained Electric Power Equipments, Pollution Control Criterion for POPs-Contained Wastes (GB13015-91), Pollution Control Criterion for Dangerous Waste Storage (GB18596-2001), Pollution Control Criterion for Dangerous Wastes Burning (GB18484-2001), Pollution Control Criterion for Urban Wastes Burning (GB 18485-2001), etc.*

**On straw burning pollution prevention:** in April, 1999, SEPA and Ministry of Agriculture issued *Management for Prohibition of Straw Burning and Integrated Utilization*.

According to *Regulation for Dangerous Chemicals Safety Management* and the State Council's requirements to amend administrative regulations pursuant to WTO Agreement, SEPA presently is revising *Environmental Management on the First Import of Chemicals and the Import and Export of toxic Chemicals* and has drawn up *Ordinance for Dangerous Chemicals Import and Export Management*

With 200 civil servants, the internal departments of SEPA include Administrative Office (Department of Education and Communications), Department of Science, Technology and Standards, Department of Planning and Finance, Department of Policies, Laws and Regulations, Department of Human Resources and Institutional Affairs, Department of Pollution Control, Department of Natural Environmental Conservation, Department of Nuclear Safety and Radioactive Management, Department of Supervision and Management, Department of International Cooperation.

Among them, Department of International Cooperation, Department of Science, Technology and Standards and Department of Planning and Finance are directly pertinent to *Stockholm Convention*. Department of Pollution Control is the executing department in SEPA to implement *Stockholm Convention, Basel Convention, and Rotterdam Convention*. Department of International Cooperation is responsible for negotiations and international cooperation.

### **2.1.3.2. Major Management Organs**

#### **? State Economic and Trade Commission (SETC)**

This Commission as a component department of the State Council is responsible for macro-regulation of the national economic in short term.

At present, the Commission directly manages 15 industrial associations such as China Petroleum and Chemical Industry Association, China Building Materials Industry Association, China Textile Industry Association, China Non-ferrous Metals Industry Association, etc and entrusts these associations manage other associations separately.

Its responsibilities pertinent to POPs include: organize the formulation of the country's industrial policies, supervise and inspect their enforcement; guide the country's industrial restructuring effort, and put forward restructuring programs for key sectors and key products, etc.

It is also responsible for national management of promoting clean production and safety production according to *Clean Production Promotion Law* and *Regulations on Safety Production Supervision and Management*.

**On POPs-contained and PCBs-contained Pesticides:** the commission is responsible for the safety supervision and management of dangerous chemicals, including examination, approval and registration on production, storage, management, and industrial use of dangerous chemicals. This function belongs to the Bureau of Work Safety, under State Economic and Trade Commission.

In Feb., 1999, State Economic and Trade Commission issued *Catalog of Lagging Production Capacity, Techniques and Products Washed Out* (the first group). The catalog includes PCBs, chlordane and Heptachlor.

**On dioxin and furan:** as the supervision sector of POPs pollution industries such as petroleum and chemical, building material, metallurgy, State Economic and Trade Commission takes great role on industrial management and industrial policies.

With 450 civil servants, internal agencies in SETC include the General Office, the Department of Policies, Laws and Regulations, the Department of General Economic Affairs, the Bureau of Economic Operations, the Department of Industrial Policy, the Department of Investment and Planning, the Department of Enterprise Reform, The Department of Small and Medium-sized

Enterprises, the Department of Enterprise Supervision, the Department of Trade and Market, the Department of Foreign Economic Coordination, the Department of Technological Progress and Equipment, the Department of Resources Conservation and Comprehensive Utilization, the Bureau of Work Safety, the Department of Electric Power, the Pharmaceutical Department, the Gold Bureau, the Training Department, the Department of International Cooperation, the Personnel Department. Among these departments, Department of Industrial Policy, the Department of Investment and Planning are directly pertinent to china fulfilling Stockholm Convention.

For the function on supervision and control of dangerous chemicals of the commission is charged by State Safety Production Supervision Administration, which is under the commission, State Safety Production Supervision Administration of China is related to POPs and its second department of safety supervision and management is responsible for safety supervision and management of petroleum, chemical industry, electric power, trade, machinery, metallurgy, medicine, weave, tobacco, etc.

### ? Ministry of Agriculture (MOA)

Ministry of Agriculture (MOA), directly under the State council, charges agriculture and rural economy development and is one of national connection sites of Rotterdam Convention

The main responsibilities of Ministry of Agriculture relating to POPs are supervision and management of pesticides with POPs.

**On pesticides production:** According to *Regulation of Pesticides Management*: China implements pesticides registration system which requests pesticides products (including original pesticides production, preparation processing and Confectioning) and importing pesticide products must be registered. So Ministry of Agriculture supervises and control pesticides from pre-producing stage via registration system.

**On pesticides import and export:** Ministry of Agriculture performs PIC program to import and export of pesticides listed in Rotterdam Convention along with performing *regulation of pesticides management*.

**On pesticides use:** Ministry of Agriculture monitors the use of pesticides with other related agencies periodically and issues lists of prohibited or limited pesticides to control their hazards by bulletin or rule.

**On agro-environment monitoring:** Agro-environment monitoring cyber has been built since 1983, and its main responsibilities are monitoring of agro-environment and pesticide remains.

**On prevention of straw burning:** According to *Management Measure for Straw Burning Prohibited and Integrated Utilization*, Ministry of Agriculture is responsible for guiding straw integrated utilization. 358 straw gasification sites had been built in China until 2001 and they took important effect on controlling straw burning.

Internal agencies in Ministry of Agriculture include General Office, Human Resources Development Department, Policy and Law Department, Rural Economic System & Operations Management Department, Development Planning Department (National Office for Agricultural Resources Zoning), Plant Culture Management Department, Farm Mechanization Department, Animal Husbandry & Veterinary Medicine Bureau (National Feed Office), Land Reclamation Bureau, Township Enterprise Bureau, Fishing Bureau, State Council Poverty Alleviation Office, Science, Technology & Education Department, Economic Information Department, Financial Affairs Department, International Cooperation Department, etc.



Among these departments, the related are Science, Technology & Education Department and Plant Culture Management Department. The former takes agro-environment monitoring in charge and the later takes pesticide registration and control in charge.

### ? **Ministry of Health (MOH)**

Ministry of Health (MOH) is a central government agency directly under the State Council, responsible for the nation's health activities.

**On health supervision and management:** MOH is responsible for the supervisions and managements of the nation's occupational health, environmental health, food health and contagion prevention and cure. Preventing people from the POPs detriment is one of the major tasks of MOH.

**On disease control (concerning the use of POPs or POPs-contained substances):** because DDT and PCP (containing certain amount of dioxin) are still allowed to use in preventing and curing diseases like ague and schistosomiasis, MOH' management activities also concern to reduce the use of DDT and dioxin.

MOH has 225 administrative staff. On the basis of its responsibilities, MOH sets up several administrative departments including: General Office, Personnel Department, Department of Planning and Finance, Department of Law Supervision, Department of Medical Administration, Department of Disease Control (executive office for the National Sanitation Movement Committee), Department of Science and Technology, Department of International Cooperation, Department of Health Protection, etc.

Department of Law Supervision and Department of Disease Control are directly involved in the implementation of Stockholm Convention. The former takes the responsibilities to prepare the administrative regulations and health criteria. The latter is the executive agency for disease control and the national disease control network.

### ? **General Administration of Quality Supervision (GAQS)**

GAQS is an executing agency directly affiliated to the State Council, taking charge of the following matters: the nation's product quality, measuring, inspection of the import and export goods, import and export sanitation quarantine, import and export propagation quarantine and authorization, standardization. GAQS also has the power to execute the relevant laws and regulations.

**On product quality (product authorization):** GAQS is responsible for issuing production permission and supervising industrial manufacturers to meet the quality requirements. According to *The Ordinance for Dangerous Chemicals Safety Management*, the licensing system for dangerous chemical products is assigned to the jurisdiction of GAQS.

**On criteria establishment:** although some of the current POPs-related standards, like *Safety Standards for Pesticide Use (GB4285-89)*, *Pollution Control Standards of Dangerous Waste Incineration (GB18484-2001)*, *The Residual Standards of DDT and Hexachlorocyclohexane in Grain, Vegetable and Other Food (GB2763-81)*, respectively were established by the Ministry of Agriculture, the State Environmental Protection Authority and the Ministry of Health, all of them were promulgated in the name of GAQS.

**On laboratory testing aspect:** with China's WTO entry, in order to meet the international standards, China has stipulated the *General requirement for the Competence of Testing and Calibration Laboratories (GB/T 15481-1995)*, in the light of the requirements of ISO/IEC principle 25, and further amended to GB/T 15481-2000 according to ISO/IEC 17025.

Thereby, GAQS will play import role in quality supervision, standard stipulation and authorization in China's fulfillment of Stock Convention.

The internal departments of GAQS include: General Office, Laws and Regulations Dep., Quality Management Dep., Metrological Supervision Dep., Propagation Quarantine Supervision Dep., Import and Export Food Safety Supervision Bureau, Boiler and Pressure Vessel Safety Supervision Bureau, Product Quality Supervision Dep., Law Executing and Inspection Dep., International Cooperation and Technical Dep., Personnel Dep., and Planning and Finance Dep.. According to the stipulation of the State Council, GAQS is also responsible for managing State Standardization Management Committee (SSMC) and State Accreditation and Authorization Supervision Committee (SAASP).

Metrological Supervision Dep., Product Quality Supervision Dep., Law Executing and Inspection Dep., SSMC and SAASP are directly involved in the implementation of *Stockholm Convention*.

### **2.1.3.3 Relevant Administrative Agencies**

#### **? Ministry of Construction**

Ministry of Construction (MOC) is a component department of the State Council, responsible for the nation's construction activities.

Pursuant to the *Institutional Restructuring Scheme* and the *Notice on the Institutional Establishment of the State Council*, MOC is responsible for setting up the development strategy and medium-long term plan of urban construction and public services, giving instructions to metropolis and cities on matters like water supply, water preservation, gas supply, central heating, public services, public transport, gardens, city image, and household waste management.

**On the use of POPs pesticide:** MOC is a major player in management of the use of POPs-contained pesticide because this kind of chemical is widely used to combat white ant which makes serious damage in the south part of china.

**On the use of dioxin and furan:** during the course of household waste treatment, wastewater treatment and asphaltum brewing at construction sites, one of the byproducts is POPs. Thereby, MOC is a relevant government agency stipulated by the *Stockholm Convention* in the term of byproduct prevention.

There are 275 administrative staff in MOC, the internal departments of which include: General Administrative Office, Comprehensive Finance Dep., Policies & Laws Dep., Science & Technology Dep., Standards & Norms Dep., Construction Market Management Dep., Quality, Safety Management Dep., Urban and Rural Planning Dep., Urban Construction Dep., Housing & Estate Industry Dep., Housing Fund Supervision Dep., Foreign Affairs Dep., Personnel & Education Dep..

The Urban Construction Dep. and Housing & Estate Industry Dep., respectively in charge of urban environmental sanitation and anti-white ant activities, are directly involved in the implementation of *Stockholm Convention*.

#### **? Ministry of Water Resources (MWR)**

MWR is a component department of the State Council, taking charge of water resource issues.

**On the water resources protection:** Pursuant to the *Institutional Restructuring Scheme* and the *Notice on the Institutional Establishment of the State Council*, MWR is given the following mandates: formulation of water conservation plan pursuant to national laws, regulations and standards concerning resource and environmental protection, demarcation of functional water areas and control of discharge of wastewater to potable water areas and other water areas, monitoring of the quantity and quality of water of rivers, lakes and reservoirs, review and approval of the pollution loading capacities of water bodies with proposal for the limit of the limit of total wastewater discharge. MWR further establish a national wide water resource monitoring network

including 250 monitoring stations. Thereby, MWR plays active role in China's environmental protection and management.

**On the use POPs-contained pesticide:** Pursuant to the *Institutional Restructuring Scheme* and the *Notice on the Institutional Establishment of the State Council*, MWR is responsible for organizing and instructing the management and protection of hydraulic facilities, water areas, dykes and coast lines. Since chlordane and mirex are major chemicals used in South China to prevent hydraulic facilities like dams from the damages of white ant. Thereby, MWR is one of the administrative agency concerning the use of POPs-contained pesticide.

MWR has 220 administrative staff, the internal departments of which include: the Bureau of Hydrology, General Administrative Office, Planning Dep., Policy & Laws Dep., Water Resource Dep., Economy Regulation Dep., Personnel & Education Dep., International Cooperation & Technology Dep., Construction Management Dep., Water & Soil Preservation Dep..

The Bureau of Hydrology and Construction Management Dep. are responsible for water resource environmental monitoring and hydro facilities construction.

### ? Ministry of Communications (MOC)

MOC is a component department of the State Council, responsible for highways and waterways.

**On the use of POPs-contained pesticide:** Pursuant to the *Institutional Restructuring Scheme* and the *Notice on the Institutional Establishment of the State Council*, MOC takes charge of organizing and implementing the construction of the national artery and main waterway, construction and maintenance of the main highways and their subsidiary facilities, construction and maintenance of water-related transportation facilities. Because white ant brings serious damage to transport facilities like bridge in South China, chlordane and mirex are used to prevent and kill white ant. Thereby, MOC is one of the administrative agencies concerning the use of POPs-contained pesticide.

**On dioxin and furan:** since the use of asphaltum in highway construction is one of the sources of POPs byproducts, MOC is one of the administrative agencies concerning the reduction of POPs byproducts.

MOC has 300 administrative staff, the internal departments of which include: General Office, Structure Reform & Law, Regulation Dep., Comprehensive Planning Dep., Finance Dep., Personnel Dep., Highway Dep., Water Communication Dep., Technology & Education Dep., International Cooperation Dep., Public Security Dep., (under the dual-leadership of MOC and Ministry of Public Security)

Highway Dep. is responsible for the construction of transport facilities like highways and bridges.

### ? Ministry of Railway (MOR)

MOR is a component department of the State Council, taking charge of rail-related issues.

**On the use of dioxin and furan:** Pursuant to the *Institutional Restructuring Scheme* and the *Notice on the Institutional Establishment of the State Council*, MOR is responsible for managing the railway-related industry, organizing and managing medium-large scale railway project. Since are allowable to be used in crosstie antiseptic, MOR is assigned a indirect role in the effort to reduce POPs byproducts.

MOR has 400 administrative staff, the internal departments of which include: General Office, Policy & Law Dep., Development & Planning Dep., Finance Dep., Technology & Education Dep., Personnel Dep., Labor & Sanitation Dep., Construction Management Dep., International Cooperation Dep., Safety Supervision Dep., Public Security Bureau, Transport Bureau.

The Construction Management Dep. is responsible for railway construction.

#### ? **Ministry of Civil Affairs (MCA)**

MCA is a component department of the State Council, responsible for social issues.

**On dioxin and furan:** Pursuant to the *Institutional Restructuring Scheme* and the *Notice on the Institutional Establishment of the State Council*, MCA takes charge of the following matters: formulation of the funeral and interment policies, pushing interment reform. Since cinerators emit POPs, MCA is one of the administrative agencies concerning the management of POPs byproducts.

MCA has 215 administrative staff, the internal departments of which include: General Administrative Office, Non-Government Organization Management Dep., Rescue & Relief Dep., Local Government & Community Construction Dep., Regional Division & Toponym Dep., Social Well-off & Social Issues Dep., Planning & Internal Affairs Dep., Foreign Affair Dep., Personnel & education Dep., etc.

The Social Well-off & Social Issues Dep. is responsible for interment issues.

#### ? **State Forestry Administration (SFA)**

SFA is directly affiliated to the State Council, responsible for china's forest industry.

**On dioxin and furan:** Pursuant to the *Institutional Restructuring Scheme* and the *Notice on the Institutional Establishment of the State Council*, SFA is assigned the following mandates: organizing, coordinating, instructing, and supervising the nation's forest fire prevention activities, organizing and instructing the prevention and quarantine activities of plant diseases and insect pests. Since bush fire can give rise to POPs byproducts, SFA is a responsible agency concerning implementing the Stockholm Convention.

SFA has 200 administrative staff, the internal departments of which include: General Administrative Office, Planting Dep., Forest Resources Management Dep., Wild Animals and Plants Protection Dep., Forest Public Security Bureau, Policy & Laws Dep., Development Planning & Capital Management Dep., Science & Technology Dep., International Cooperation Dep., Personnel & Education Dep., etc.

The Forest Public Security Bureau is responsible for the nation's fire prevention.

#### ? **State Oceanic Administration**

SOA is an administrative agency affiliated to the Ministry of Land and Resources, responsible for management and supervision of sea area use and marine environmental protection, organization of the research for marine science and technology. Thereby, SOA involves in the implementation of Stockholm Convention.

SOA has 100 administrative staff, the internal departments of which include: General Administrative Office, Sea Area management Dep., Marine Environmental Protection Bureau, Science & Technology Dep., International Cooperation Dep., Personnel Dep., etc.

The Marine Environmental Protection Bureau is responsible for marine environmental protection.

### **2.1.3.4 Diplomatic, Macro-Regulation, and Technology Management Agencies**

#### ? **Ministry of Foreign Affairs (MFA)**

MFA is a component organ of the State Council in charge of foreign affairs. MFA definitely involve in the implementation of the Stockholm Convention.

### ? **State Development and Planning Commission (SDPC)**

SDPC is a macro-regulation organ directly affiliated to The State Council, responsible for devising strategies and plans for national economy and social development, balancing total societal demand and supply, regulating economic structure.

The major functions of SDPC concerning POPs include: Pursuant to the *Institutional Restructuring Scheme* and the *Notice on the Institutional Establishment of the State Council*, devising national development strategies, balancing total societal demand and supply, setting targets and working out regulatory policies to rationalize the economic structure, and determining an appropriate growth rate, coordinating the development plans of major industries, allocating domestic-fund construction projects, the nation's major development projects and the major foreign-fund projects, formulating pricing policies, regulating the general price level and the prices of major state-controlled commodities and standardizing fees. SDPC is also the leading organ for implementing China's 21st century agenda.

### ? **Ministry of Finance (MOF)**

MOF is a macro-regulation organ directly affiliated to The State Council, responsible for management of the nation's income and expense, devising financial and tariff policies and regulations, managing the state capital fund. Financially, the involvement of MOF is indispensable for the implementation of the Stockholm Convention.

### ? **Ministry of Science and Technology (MST)**

MST is a component organ of the State Council, taking charge of science and technology development. MST is the joint-leading organ together with SDPC, exercising functions in issues relating to china's 21<sup>st</sup> agenda. MST also bears the responsibilities for the routine management for devising and implementing the agenda, encouraging international cooperation, providing technical support in sustainable development field. Thereby, in order to enhance capital investment in scientific research and technical support, the involvement of MST is very important.

## **2.1.4 Relevant Local Involved Organizations**

As previously mentioned, People's Congresses and People's Governments have been established at local levels. Generally, environmental protection authorities, health authorities, quality inspection agencies, agriculture agencies, construction agencies have been set up in the government framework at county level or above. Even at township level in some areas, there are administrative agencies in charge of health, agriculture issues.

Local governments and their related agencies are responsible for executing laws and regulations, thereby, they will play a important role in implementing Stockholm Convention.

Without infringement of the national laws and regulations, people's governments above county level can promulgate local regulations and ordinances. For example, in Feb. 2001, Shanghai Economic Commission, together with the Municipal Fire Bureau, the Municipal Environmental Protection Authority and the Municipal Industry and Commerce Authority, promulgated *The First Prohibiting or limiting Production Index for Dangerous chemicals in Shanghai municipality*, which clearly defined the prohibited chemicals including 12 kinds of POPs.

In 1999, both Tianjin and Nanchang municipal governments promulgated similar local ordinances in their jurisdictions.

### 2.1.4.1 Environmental Protection Network

Environmental protection administrations (EPA) have been widely set up at provinces, autonomous regions, and municipalities under central government. Most autonomous districts and municipalities under provincial government, as well as some county-level governments, have established their environmental branches.

These local EPAs exercise functions and powers in the following areas: under the leadership of the local governments and the upper EPAs, implementing the environmental laws and regulations, drafting local environmental regulations and ordinances, devising and overseeing implementation of local environmental protection strategies, conducting unified supervision of local air quality, water quality, soil, noise, solid waste, chemicals and vehicle pollution.

The internal setup of local EPAs is quite similar to that of SEPA

#### ? Provincial level, like **Yunnan provincial EPA (YEPA)**

YEPA is the administrative department in charge of environmental protection directly under Yunnan Provincial Government, whose main responsibilities is but not limited to.

(a) YEPA takes charge of implementing environmental protection laws and regulations throughout the province. Conducting environmental impact assessments for major construction projects and economic development programs, drawing up environmental protection plans and programs for the province, and take part in formulating medium-long term national economic and social development plans, territorial planning, and regional planning; taking part in devising sustainable development programs for the province; organizing, devising and supervising pollution prevention plans and ecological conservation plan for sensitive areas and significant drainage areas; organizing environmental function division.

(b) Conducting unified supervision of air quality, water quality, soil, noise, solid waste, toxic chemicals and vehicle exhaust through the province; overseeing the running of waste treatment facilities; organizing province-wide environmental inspections; instructing and coordinating significant cross-border environmental issues; organizing investigations of significant environmental and ecological incidents; coordinating pollution disputes among regions and cities; organizing and coordinating prevention and conservation for significant drainage areas; taking charge of environmental inspections.

(c) Carrying out the national environmental quality standards and pollutants discharge standards; devising and supervising provincial environmental quality and discharge quality; assessing the environmental section of city's master plans; organizing compilation of the provincial environmental quality Report; releasing the Yunnan province's environmental bulletin; regularly releasing environmental quality of major cities and sensitive drainage areas.

(d) Taking charge of environmental statistics and information collection; drawing up environmental monitoring system and norms; building and managing provincial monitoring network and information network; organizing province-wide environmental monitoring and pollution sources monitoring; organizing and instructing popularizing and educational programs; encouraging general public and non-government organizations to take part in environmental protection.

The internal departments of YEPA include: General Office, Planning and Finance Dept.; Law and Policy Dept.; Science & Technology and Standards Dept.; Pollution Control Dept.; Supervision and Management Dept.; International Cooperation Dept.; Human Resources Dept. Supporting institutions directly under YEPA comprise Solid Waste mManagement Center, Provincial Environmental Monitoring Center and Provincial Environmental Inspection Agency.

? Autonomous district level (including municipalities directly under provincial government), like **Kunming Municipal Environmental Protection Administration (KMEPA) IN Yunnan province.**

KMEPA is the environmental branch of Kunming Municipal Government, whose main responsibilities is but not limited to:

(a) KMEPA takes charge of implementing environmental protection laws, regulations, ordinances, and policies throughout the municipality; Drafting local environmental regulations and ordinances and supervising the implementation; Together with other relevant authorities, setting up and implementing environment-related economic, technical, resource allocation and industrial policies.

(b) Implementing national and local environmental standards (environmental quality standards, pollutant discharge standards, environmental basal norms, etc) and environmental standards for industrial sectors.

(c) Drawing up environmental protection plans and programs for the municipality, and take part in formulating medium-long term national economic and social development plans, territorial planning, and regional planning; taking part in devising the municipal master plan; assessing the environmental section of the master plan. Managing the municipal environmental statistics and information collection.

(d) Conducting unified supervision and management of the municipal environment like air quality, water quality, soil, etc. supervising and preventing and managing wastewater, fume, noise, solid waste, toxic chemicals, radiated materials, vibration, electromagnetic wave and vehicle exhaust throughout the municipality;

(e) Instructing and managing municipal monitoring network and information network; building monitoring system, norms; instructing monitoring quality ; tracking pollution sources; compiling the municipal environmental quality report; promulgating environmental bulletin.

The internal departments of KMEPA include: General Office, Planning Dept.; Science & Technology and Standards Dept.; Pollution Control Dept.; policy and regulation Dept.; development management Dept.; Human Resources Dept. Supporting institutions directly under YEPA comprise the Municipal Environmental Monitoring Station and Municipal Environmental Inspection Agency.

? County-level, like **Baoying Environmental Protection Administration in Jiangsu Province**  
BEPA is an administrative branch of Baoying County Government, whose main responsibilities is but not limited to:

(a) Implementing the national environmental guidelines, policies, laws, regulations and ordinances, drawing up local environmental plan.

(b) Devising, implementing and supervising local environmental plan

(c) Taking part in formulating medium-long term national economic and social development plans, territorial planning, regional planning, industrial development planning and resources conservation planning; assessing the environmental section of the town master plan. Taking part in natural resource assessment.

(d) Responsible for rural industrial pollution prevention and treatment, environmental monitoring, pollution sources investigation and pollution alleviation proposals.

(e) Taking charge of local environmental inspection, imposing discharge fare, and making administrative sanctions.

(f) Organizing local environmental popularizing and educational programs, managing research on environmental technology, managing environmental industry, and taking charge in environmental statistics and information collection.

(g) Together with other relevant agencies, managing the utilization of natural resources and protection of argi-ecological sites, conservative zones, scenic sites and historic sites.

BEPA has five functional departments: General Office, Environmental Management Dep., Planning Dep., Policy & Law Dep., and Natural Protection Dep..

#### **2.1.4.2 Economic and Trading System**

Economic and trading commissions (ETC) are widely established at province-level. Usually, municipal governments and county governments have their own ETCs. The local ETCs at different hierarchy are responsible for macro-economy regulation. They take part in environmental protection by setting up economic regulatory targets, policies and measures.

For example, the functions of Shanghai Municipal Economic Commission include instructing and improving energy saving, material-saving and comprehensive utilization; coordinating, supervising and inspecting environmental protection at industrial sector. SMETC has established Department of Energy Saving & Environmental Protection and the Department of Metallurgy and Chemical to deal with environmental issues.

#### **2.1.4.3 Agricultural System**

The bureaus of agriculture (BOA) are established at all province-level government throughout the nation. They help the Ministry of Agriculture to register pesticide in their jurisdictions, and responsible for supervision and management of the use of pesticide. The BOAs at municipality level are responsible for the use of pesticide in their jurisdiction.

For example, Shanghai Agriculture and Forest Bureau (SAFB) is an administrative branch responsible for pesticide management. SAFB help MOA to register pesticide use, and takes charge in pesticide management in Shanghai municipality. Entrusted by SAFB, Shanghai Pesticide Testing Institute takes the responsibilities of registering pesticides and supervising the use of pesticides. In order to enhance the safety management of the use of pesticide, the municipal government promulgated some local regulations like *Stipulation on Management of Pesticide use in Shanghai Municipality*, *Stipulation on Pesticide Quality Testing in Shanghai Municipality* and *Ordinance on Safety of Esculent Agricultural Product (trial)*

#### **2.1.4.4 Health System**

Health departments have been widely established at province-level. Usually, municipal governments and county governments have their own health departments in charge of health issues in their jurisdictions. Health departments have played important role in the nation's health activities.

#### **2.1.4.5 Construction System**

Construction commissions at different hierarchy are responsible for administrative management for construction activities. They take part in the implementation of Stockholm Convention by means like setting up the development strategy and medium-long term plan of urban construction and public services, giving instructions to metropolis and cities on matters like water supply, water preservation, gas supply, central heating, public services, public transport, gardens, city image, and household waste management.

### **2.2 Supporting Organizations**



Intensive technical support is necessary for the management of chemicals. Due to the ongoing staff-cut and restructuring of the State Council, some governmental functions have been assigned to subordinate non-profit organizations. The major organizations that give technical support for the management of POPs include:

### **2.2.1 Environmental Protection System**

In order to improve pollution prevention and comprehensive supervision, SEPA has established several professional technical supporting organizations including Chemical Registration Center (responsible for import and export chemical registration), the nation-wide environmental inspection agencies which have over 10 thousands employees (responsible for environmental inspections), the Foreign Cooperation Center (responsible for environmental-related foreign cooperation). Solid Waste Management Centers are set up at province-level, responsible for technical support for solid waste management.

#### **? Chemical Registration Center (CRC-SEPA)**

Chemical Registration Center (CRC) is a professional chemical environmental management organization, belongs to and provides technical support for Chinese State Environmental Protection Administration (SEPA). CRC is attached to Chinese Research Academy of Environmental Sciences (CRAES), and is directly responsible to Division of Solid, Pollution Control Bureau (SEPA). The works of it include: the implementation of *Environmental Management on the First Import of Chemicals and the Import and Export of toxic Chemicals*, improving methods and technologies of the environmental management of chemicals in China.

CRC-SEPA has four sections: Registration Office, Technique Supporting Office, General Affairs Office, and Chemical Testing Laboratory. Currently, It has 26 staff including 3 senior researchers, 1 associated researcher, 14 engineers.

After found in 1994, pursuant to *Environmental Management on the First Import of Chemicals and the Import and Export of toxic Chemicals*, the center have assisted SEPA in supervising the import and export of toxic chemicals.

It has the following responsibilities:

(a) Implementing *Environmental Management on the First Import of Chemicals and the Import and Export of toxic Chemicals*. (b) drafting *regulations on registration of the import and export of dangerous chemicals* and preparing relevant technical documents. (c) Drafting *environmental management on new chemical substances* and preparing relevant supporting documents.(d) regularly amending *inventory of existing chemical substances in china*. (e) Preparing the technical support to SEPA's international negotiations related to Stockholm Convention and other activities. (f) Preparing the technical support to SEPA's international negotiations related to Rotterdam Convention and other activities. (g) Providing technical support for inter-government activities like IFCS, GMA, PTS, etc. (h) compiling technical documents on environmental management of chemicals, e.g. *Guidelines of Risk Assessment of Chemicals* and *Guidelines of Testing Chemicals*, etc. (i) Constructing chemical testing labs and related guidelines and standards.(j) Providing technical support for destroying the abandoned Japanese chemical weapons (k)Organizing researches on computerized network of chemical environmental management. (l) Participating in POPs pesticide control programs and INP PDF-B programs.

The chemical testing lab has been found since 1995. The lab regards "JUSTNESS, STANDARDIZATION, SCIENTIZATION, ACCURATENESS" as its motto, and strictly manages according to the *guidelines of China National Accreditation Committee for Laboratories* (CNACL). The lab was accredited by CNACAL on Jan. 2002

#### **? Foreign Economic Cooperation Center (FECC-SEPA)**

FECC exercises the following functions:

- (a) Carrying out foreign economic cooperation in environmental field.
- (b) Taking on routine management of external cooperation in non-profit field.
- (c) Implementing routine management of environmentally international pacts.
- (d) In charge of the day-to-day activities of China Council for International Cooperation on Environment and Development, and
- (e) Taking charge of routine management and service activities of international cooperation and exchange.

**? The Inspection Center for Environmental Emergency (Environmental Supervising Office) (ICEE)**

ICEE is responsible for the following matters:

- (a) Organizing and supervising the investigations for significant environmental incidents, coordinating and instructing to deal with environmental emergencies, coordinating efforts to deal with major environmental problems involving different river basins and regions; resolving inter provincial environmental disputes
- (b) Building and managing national responding system for environmental emergencies.
- (c) Responsible for environmental hot line, tackling significant environmental cases.
- (d) Taking part in devising policies, regulations, ordinances and standards, preparing relevant documents, and supervising the implementation of them.
- (e) Entrusted by SEPA, supervising and managing national environmental inspections, organizing on-site inspections on pollution sources, organizing national inspections on the executing of environmental laws and regulations.
- (f) Entrusted by SEPA, taking audits on waste discharge fare imposing system, organizing national inspections on administrative capacity to execute environmental laws and regulations.

**2.2.2 Economic and Trading System**

**? Chemical National Registration Center, SSPSA**

Chemical National Registration Center is established by State Safety Production Supervision Administration under State Economic and Trade Commission, responsible for registering chemical circulation in China, discriminating and designating chemicals to different dangerous levels, proposing prevention measures, assessing attached MSDS and Chemical Labels. It is located at the compound of CPCC's Qingdao Institute for Safety Project.

The center's major tasks include: (a) Assessing and Designating chemical's dangerous level. (b) Registering domestic- produced and imported dangerous chemicals, instructing applicants to prepare MSDS and Chemical Labels; (c) Establishing national chemical emergency help network, setting up hot line, providing consulting services for enterprises. (d) Providing vocational training to related involvers.

The center has four sections including registration department, emergency department, training and education department, and data analysis department. It has a well-training staff, including over 10 full time professors, senior engineers and engineers, and further 50 concurrent professionals to actively participate in data assessment and emergencies consultation.

The center has established a nation-wide hot line, offering emergent help for chemical incidents or on-site rescues.

Presently, over 30 Dangerous Chemical Registration Offices have been established throughout the nation.

### **2.2.3 Agriculture System**

#### **? Institute for Control Agri-chemicals, MOA (ICAMA)**

ICAMA is directly affiliated to MOA, responsible for registration and supervision of the produce and use of pesticides throughout the nation. The major tasks for IPE are: (a) Implementing the nation's guideline and policies on pesticide, organizing primary research for pesticide-related administrative regulations and ordinances, advancing proposals on pesticide management. (b) Building national pesticide management network; (c) Registering and certificating (d) Examining pesticide advertisements, making decisions on the import and export of pesticides;(e) Managing the registration of pesticides and taking researches on pesticides testing methods; (f) Devising technical norms and standards; (g) Taking responsibilities on quality management, residual examining and incident investigations; (h) Providing training for related involvers, instructing local IPEs' work; (i) In charge of international cooperation on pesticide issues; (j) According to the requirements of PIC Pact, informing exported pesticide to foreign counterparts.

ICAMA has 10 departments, respectively, Pesticide Administration Dep., Supervision Dep., Information Dep., Biologic Monitoring Dep., Testing Dep., Residual Dep., Comprehensive management Dep., Planning and Financial Dep., Administrative Dep., and Consulting Center. IPE has 90 staff, mainly comprised by senior, medium-level professionals.

According to *Ordinance of Pesticide Management*, ICAMA is responsible for the nation's pesticide registration. Local institutes for control agri-chemicals are responsible for pesticide management in their jurisdictions.

30 provincial institutes for control agri-chemicals, together with those municipal institutes, assist ICAMA to conduct primary chemical assessments and supervise the use of pesticides in their jurisdictions.

### **2.2.4 Construction System**

#### **? National Center for Termite Prevention and Control (MOC)**

National Center for Termite Prevention and Control is under dual-leadership of MOC and the Construction Department of Zhejiang Province, staffed with 10 employees. 7 of them own professional certificates. The major tasks of the center are to organize, instruct and coordinate the nation's white ant prevention. It also engages in conducting research programs.

## **2.3 Technical Supporting Organizations**

### **2.3.1 Monitoring and Analyzing Organizations**

See also *Primary Review Report on China's POPs Laboratories*.

### **2.3.2 Research Institutes**

The research fields concerning Stockholm Convention are extensive. The following descriptions are focusing on substitute research, pollution control, environmental chemistry, toxicology and ecologic toxicology to give a picture about china's POPs research institutes.

### **2.3.2.1 Substitute Research**

#### **? Shenyang Chemical Industry Research Institute**

Shenyang Chemical Industry Research Institute is a large-scale technical enterprise under the leadership of Enterprise Management Commission of the State Council, which has 1200 employees, mainly involving in researches and developments of chemical products. The State Pesticide Association, Dye Product Quality Monitoring Center, Information Center, the Chinese Pesticide Council and Dye Industry Association are affiliated to the Institute. Recently, the National Research Center on pesticide and the National Dye Research Center have been established in the institute. The institute has completed 2100 research programs, 120 industrialized programs since it was found 50 years before.

See also 2.3.2.3 referring to pesticide safety assessment

#### **? Hangzhou Institute for Termite Prevention and Control**

The institute has been found more than 30 years. 17 of its staff are engineers at different levels or experienced technicians. There are several research departments and facilities including laboratory, termite-domesticated lab, constant- temperature lab, non-bacteria lab, sample showcase room, information office and some specialized research equipments and machines.

The institute has completed some province-level or municipality-level research programs. It also has explored a number of new methods like microbe method, LX method, chlordane method to combat the damage of termites.

In 1994, the institute had developed a new preparation (25%L.X) for anti-termite which synthesize silafluofen and organic phosphorus

### **2.3.2.2 Pollution Control**

#### **? Shenyang Environment Science Research Institute**

Shenyang Environment Science Research Institute is a major research institute on environmental protection under the dual-leadership of SEPA and Shehyang Municipal Government, which currently has 132 researchers. There are several departments directly concerning POPs including Solid Waste Dep., the National Technical Center for Dangerous Solid Waste Treatment and PCBs Incineration Laboratory.

The ongoing POPs research programs include: *Environmental Impact Investigations and Assessments of Typical PCBs Contaminated Areas in China*, *Research Project on PCBs Industrial Incineration*, etc. SRIES is also responsible for PCBs section in NIP-PDF-B project.

The National Technical Center for Dangerous Solid Waste Treatment have been found in 2002. Nearly 5 million RMB have been invested for the construction of the center which occupies 7000m<sup>2</sup> site area and 1200m<sup>2</sup> building area. There are three pilot facilities, respectively, incineration, metal utilization and bio-treatment. Solid Waste Testing Laboratory and Treatment Technique Laboratory are attached to the center. It can takes on major research projects in the field of dangerous waste treatment. The center have carried out environmental investigations on POPs distribution, risk assessments for POPs contaminated sites, and research projects on POPs techniques. The other research areas include hospital waste treatment techniques, rolling incinerator, Dioxin removing integrated equipment, etc.

The PCBs pilot base in the center is the first PCBs industrialized treatment base in China, which has treatment capacity of 500 tons per year. Currently, an incinerating line budgeted 64.85 millions RMB with 8000 tons treatment capacity per year is under construction, which is comprised by two rolling incinerators, one of them is for PCBs treatment. The effluent is totally

reused after deep decontamination. Pursuant to GWKB2-1999, the fume is discharged after deep decontamination. The whole line is automatically under control of DCS built-in system. The environmental impact assessment and primary design have been done. The line have entered construction phase since April, 2002, and projected to trial at the end of the same year.

### **? Department of Environment Science and Technology, Tsinghua University**

The department is the center for educational and scientific search in the field of environmental science and engineering. Presently, the faculty has 80 staff and nearly 300 undergraduates, 70 postgraduates and 90 PHD students. FESE has established a working station for post-PHD scholars, which has recruited post PHD scholars both from domestic and abroad.

There are 8 research institutes and centers including Research Institute of Water Quality and Engineering, Research institute of Air pollution Control, Institute of Solid Waste Control and Reuse, the State key Laboratory for Environmental Imitation and Pollution Control, etc..

The Institute of Solid Waste Control and Reuse is one the first research organizations to take researches on solid waste reduce, reuse, and harmless. Since 1984, The major tasks of ISWCR have been set to conduct researches on harmless techniques of dangerous solid waste, industrial solid waste, urban garbage, agricultural solid waste, conduct researches on solid waste filling, incineration, compost, reuse and relevant policies. The institute has completed many significant research programs and engineering projects, developed some advanced treatment techniques which suitable to china's concrete situations.

ISWCR has a strong teaching and researching team including 4 professors, 2 associate professors, 1 lecturer, 3 post-PHD researchers, 2 visiting scholars, 9 PHD students, 17 postgraduates.

Research projects that recently have been done include *Investigations and Countermeasures on the Management of Used Battery*, *Techniques for Dangerous Waste Reduction*, *The State Acting Initiative and Decision-making Supporting Information System on Dangerous Waste*, *The Prevention and Treatment Techniques for Dangerous Waste Pollution*', etc... The ongoing programs include *The Feasible Research of Dangerous Waste Filling Site in Shanghai Municipality*, *The Research for 150t/d Urban Garbage Upright Incinerator*, *The Design and Produce Research for 80t/d Industrial Waste Incineration System*, *The Localization of Integrated Facilities of Urban Garbage Incineration*, *The Techniques of Waste Stabilization in Shenzhen Municipality*', etc...

Found in 1999, the POPs research center in the department have conducted research project *POPs Environmental Characteristics and Removing Theory*. The major components of this project include: the classify strategy and computerized supporting system of POPs-related substances, the analysis methods and instant test technique for POPs substances, the environmental impact and quantitative correlation, typical POPs multi-media circulating model, etc..

### **2.3.2.3 Environmental Chemistry**

#### **? Research Center for Eco-Environmental Sciences, Chinese Academy of Sciences (RCEES-CAS)**

RCEES-CAS, formerly Institute of Environmental Chemistry, Chinese Academy of Sciences, was founded in 1975. The major research areas are environmental science, environmental engineering and macro-ecology.

Currently there are 308 staff in RCEES, one third of them are senior researchers. There are 6 research departments or laboratories including State Key Laboratory of Environmental Aquatic Chemistry, Key Laboratory of Systems Ecology of CAS, Open Laboratory of Environmental Chemistry and Ecological Toxicology, 3 departments for administration or management and other

sections, respectively, Technical Development Dep., Personnel & Education Dep., and General Office. It further has a hi-tech industrialized center.

RCEES is one of the first research organizations concerning POPs. Some research conclusions have provided scientific support for decision-making. It has advantages in basal and application research on environmental contamination chemistry, environmental aquatic chemistry and environmental analysis chemistry in China, and has made many scientific achievements. Early from the middle of 1970s, the center has carried out researches on DDT-contained pesticide. Early in 1980s, the center had laid the foundation of environmental monitoring by publishing *Environmental Contamination Analysis Methods* which contained 220 analysis methods in 66 programs. As early in 1979, the center took POPs investigations and researches in China. In 1992, the center had conducted state-funded research program *The Movement and Its Ecological Response of Typical Chemical Pollutants*, which included components on POPS byproducts like PCBs, dioxin. The major working areas concerning dioxin in the center include: qualitative and quantitative analysis of dioxin content in chemical products, flying ash, soil, deposited mud and water, techniques and equipments for reducing dioxin content in fly ash, etc... Recently, the center has used HRGC/LRMS method to test dioxin, hydro-VOC and soil-related VOC and SVOC. RCEES had carried out comparative research with the international certificated laboratory. Some high-sensitive MASS have been ordered to build qualified dioxin laboratory.

Of the environmental pollution control and waste reuse, the center has been granted many patents, concerning dioxin-related pollutants control of the tail-gas emission from incinerators, dioxin-related pollutants control of the tail-gas emission in melting furnaces and dioxin-related reduction of DDT pyrogenation process.

#### ? **Guangzhou Research Institute of Geochemistry, Chinese Academy of Sciences (GRIG-CAS)**

The major research areas of GRIG-CAS are geochemistry and mineralogy. GRIG-CAS has given priority to organic geochemistry and isotope geochemistry, actively encouraged researches in new areas like environmental geochemistry, regional sustainable development and marine geochemistry. There are five research laboratories were found in GRIG including State Key Laboratory on Organic Geochemistry, Guangdong Provincial Key Laboratory on Resource Reuse and Protection, Guangdong Key Laboratory on Mineral Materials and CAS Isotope Geochemistry Laboratory.

Currently there are 315 staff in GRIG, including 56 researchers. It has right to confer Master Degree and PHD, and set up a post-PHD working station. It also publishes the state key scientific journal *Geochemistry*, Guangdong Mineral Geochemistry Association and Guangdong Sustainable Development Research Association are affiliated to GRIG.

In recent years, GRIG has carried out extensive POPs-related works in Pearl Delta, including the monitoring and analysis of POPs substances in environmental medias like water, atmosphere and mud.

#### ? **College of Environmental Sciences, Peking University**

The college was founded by the mergence of former Environmental Science Center and the Faculty of Urban and Geo-Environment, which has two major laboratories, respectively, the Geo-Surface Dynamic Laboratory (GDL) and State Key Laboratory on Environmental Imitation (LEI).

GDL is the key laboratory of the Ministry of Education, whose major tasks include analysis of POPs and PCBs content in soil, deposited mud, fishes, and plants, finding their expose models and movement, conducting risk assessments to ecosystem and human body. The laboratory is featured with employing GIS to indicate the research results on maps.

LEI focuses on environmental imitation analysis, POPs samples testing, POPs distribution and environmental circulation.

#### **2.3.2.4 Safety Assessment (Toxicology, Eco-Toxicology)**

##### **? The State Shenyang New Drug Safety Assessment Center, the State testing Center for Pesticide Assessment and Quality Supervision of Chemical Industry, the Pesticide Safety Assessment Center of Shenyang Research Institute**

Found in 1982, the center was jointly invested by the former Ministry of Chemical Industry, UNDP and UN Industrial Development Organization, mainly responsible for safety assessment of medical and pesticide products.

The administrative departments of the center include: Quality Management Dep., General Office, and Computerization and Information Dep.. Its research departments are made up of General Toxicity Dep., Special Toxicity Dep., Clinical Pathology Dep., Environmental Assessment Dep., The center further has a Trans-gene Research Dep..

Currently there are 60 staff in the center.

The center is located on a large compound, including experimental facilities, experimentally supporting system, lawns, playgrounds, glasshouses, incinerating facilities, garbage collection station, wastewater treatment facility, water supply system. The full encircled system occupies 1326 m<sup>2</sup>. It also owns a 200m<sup>2</sup> metabolizing laboratory.

From the very beginning of the establishment of this center, it has carried out its tasks pursuant to the requirements of GLP to make sure good quality. The center has a good organizational structure, well-training professionals, state-of- art equipments and facilities. It also has been accredited by relevant authorities. The center has completed a number of safety assessment projects on medical & pesticide products and pesticide residuals both from domestic and abroad.

##### **? The China Center for Disease Control and Prevention (China CDC).**

China CDC is a nonprofit institution working in the fields of disease control and prevention, public health management and provision of service. There are 12 professional institutes/centers affiliated to China CDC: Institute for Infectious Disease Control and Prevention, Institute for Viral Disease Control and Prevention, Institute for Parasitic Disease Control and Prevention, National Center for AIDS/STD Control and Prevention, National Center for Chronic and Non-communicable Disease Control and Prevention, Institute for Nutrition and Food Safety, Institute for Environment Hygiene and Health Related Product Safety, Institute for Occupational Health and Poison Control, Institute for Radiological Protection and Nuclear Safety, Institute for Health Education, National Center for Rural Water Supply Technical and Guidance, National Center for Maternal and Child Health Care.

Under the leadership of Ministry of Health of the People's Republic of China, and according to the country's key tasks on disease control and prevention, China CDC: strengthens research on strategies and measures for disease control and prevention; organizes and implements control and prevention plans for different kinds of diseases; carries out public health management for food safety, occupational health, health related product safety, radiation health, environmental health, health care for women and children, among others; conducts applied scientific research; provides technical guidance, staff training and quality control for disease control and prevention and public health services throughout the country; acts as national working group for diseases prevention, emergency relief, and construction of public health information systems; entrusted by MOH, carries out quality assessment, safety assessment and risk assessment for health products.

##### **? Chemical Testing Technology Research Laboratory, SEPA**

Established in 1994, The laboratory is affiliated to Chemical Registration Center, SEPA. Its aim is to provide high quality test data for the effect of biotic system, biodegradation and bioaccumulation of chemicals and environmental samples. There are 13 researchers in the lab. It occupies 140 m<sup>2</sup> office area and near 700 m<sup>2</sup> testing area (including 140 m<sup>2</sup> culture section). The lab has three culture systems including: The culture system for fish, The culture and breed system for daphnia, The culture system for alga. The fish species bred in the lab include not only which is recommended by international organizations, i.e. ISO, OECD, but also which are hopeful to become the standard test fish species in China, and found uniquely in China.

The lab was accredited by China National Accreditation Committee for Laboratories (CNACL) on Jan.2002. The scope accredited include: Alga growth, Inhibition test; Daphnia sp. Acute immobilization test ; Fish, Acute toxicity test .

#### **? Institute of Hydrobiology, Chinese Academy of Science**

Founded in 1950 in Shanghai, IH (GAS) moved to Wuhan, Hubei Province in 1954. There are 7 research departments including State Key Laboratory of Freshwater Ecosystem and Biotechnics, Fish Research Dep., Fish Genetic and Breeding Dep., Fish Disease Dep., Freshwater Ecology Dep., Alga Research Dep., Water Pollution Biology Dep., Minever Research Dep.. In Sep. 1996, together with the Eco-chemistry Institute of Germany Environment & Health Research Centre, IH (GAS) established a joint laboratory, which is the first dioxin research laboratory in China. The major research programs concerning POPs include the research on toxic organ environmental chemical behavior and its toxicity. Entrusted by SEPA, IH established the standard *Testing Methods of PCBs with Dioxin, PCBs with Furan*'.(HJ/T77-2001). The ongoing POPs programs include the research on dioxin sources, ecological effect, toxicity of POPs water pollution and bio-treatment.

#### **? Nanjing Environmental Science Research Institute**

Found in 1978, the institute is directly affiliated to SEPA. The Department of Pesticide Environmental Assessment and pollution control and Key laboratory on Pesticide Environmental Assessment and Pollution Control in the institute have been the national research center for pesticide environmental assessment, environmental toxicity, pesticide environmental safety assessment, and treatment techniques. The institute provides technical consultation and services for new pesticide development.

#### **2.3.2.5. Other Organizations**

##### **? Beijing Chemical Industry Research Institute, Chinese Petroleum Chemical Ltd.**

Found in 1980, the institute is the key environmental protection research organization in Chinese chemical industry, which has more than 70 professionals. The internal departments of it include pollution treatment Dep., Cleaning Production and Dangerous Chemicals Safety Management Dep., Pesticide Residual Testing Dep., Environmental Monitoring Dep., Environmental Impact Assessment Dep., Environmental Information Dep., and Project management Dep.. Environmental Monitoring Center of Chinese Chemical Industry, Cleaning Production Center of Chinese Chemical Industry, Environmental Technology Information General Station, and the Environmental Commission of Chinese Chemical Industry Council are also affiliated to EDBRICI. EDBRICI have carried out a number of research works in fields like waste treatment, dangerous chemicals safety control, environmental impact assessment, residual testing, cleaning production and environmental information.

In recent years, projects that have been completed by EDBRICI on safety management of dangerous chemicals and pesticides include: (a) the regional cooperation project *Safety Management for Toxic Chemicals and Harmful Waste* (UNDP & WHO); (b) taking part in *Enhancing Chinese Environmental Standards and Implementation Policies* (ADP); (c) taking part in WB's project *Promoting Cleaning Production in China (B-4)*; (d)*The Sustainable Development*



*Strategies for China's Chemical Industry(SDPC); (e)The Classification and Control Strategies for Environmental Management of Key Chemical Substances(SEPA)*

Presently, the institute has been taking part in Sino-Italy joint project *Disuse and Reduction Strategies of POPs-contained Pesticide*, mainly working on chemical industry investigations. EDBRICI also works on UNIDO's project *Preliminary Assessment on Disuse of POPs in China*.

#### **2.4. Popularizing, Educational, and Training Organizations**

Schools, publishers, presses, and mass medias like broadcast and television are major channels for environmental education. MOE, State News and Press Authority, State Broadcasting, Film and Television Bureau are the administrative departments for the nation's popularization and education. The other governmental authorities also have their own educational departments. For example, SEPA has its environmental popularizing and education center. Usually, popularization, education and training are major tasks for information organizations. Occasionally, Research institutes also work on these fields. With the reform going deeper, NGOs like associations and councils have played more important role in improving environmental knowledge and environmental awareness for general public. The following are several major environmental popularizing, educational, and training organizations

##### **? Center for Environmental Education and Communications, SEPA**

The center is the center of state environment popularization and education network and the producing and training base for environment-related movies and TV programs. It also acts as a window for foreign cooperation. Its major functions include: organizing and undertaking nationwide environmental popularizing activities, managing public information inquiry system; compiling environment protection teaching materials; making environment-related TV programs; providing professional training; instructing local PECs.

The center sets up several departments including: Popularizing Dep., Education Dep., and Audition & Visual Dep. There are 30 staff in the center. It has comparatively advanced equipments for photographing and film developing, movie shooting equipments, and facilities for training and conventions, which have multi-functions to meet the needs of preservation, searching, reproducing and shooting. After founded, it have made delightful achievements in the aspects of implementing GLOBE plan, international environmental technology exchange ,training , making environment-related movies .

##### **? China Environment News, SEPA**

China Environment News is directly affiliated to SEPA .Its major tasks are to publicize environment protection guidelines and policies, spread environmental information, and promote green awareness. Founded in 1984, it is the first newspaper at state level engaged in environment protection popularization, which has truly recorded the footprints of Chinese environment protection history. It has played an important role in improving environmental awareness of the general public and popularizing environmental knowledge.

##### **? China Environmental Science Press, SEPA**

Founded in 1980, China Environmental Science Press is the only environmental-related publisher in China, the publications issued by which mainly are environment-related books and periodicals in the fields of environmental management, environmental engineering, environmental law, environmental economy, environmental supervision. The three periodicals published by China Environmental Science Press are *Environmental Protection*, *Global Environment*, and *Environmental Education*. China Environmental Science Press also makes auditory and visual products.

##### **? National Environmental Information Center, SEPA**

National Environmental Information Center instructs the national information collecting system. Its major tasks are to collect, analyze, store data, process and circulate all kinds of environment information, provide environmental consulting services, develop computer software, provide professional training, initiate connection with international high speed information net, carry out technology exchange and provide information inquiry services.

#### ? **China Environment Science Society, SEPA**

Founded in 1997, China Environment Science Society is the largest nationally non-government and non-beneficial organization with longest history specialized in environment protection. The main supporting departments are Environment Protection Agency and China Science & Technology Academy. It take perfect effects in all aspects including: spreading environmental protection science knowledge, enhancing environmental protection consciousness of the whole country, improving environment science, providing counseling to Chinese government for macro-decision, mobilizing the general public to participate in environment protection movement, etc. At same time, it has developed good exchange and cooperation relations with many international organizations, environment protection departments of foreign governments, overseas environment protection companies, overseas environment science research institutes.

#### ? **Chinese Central Television (CCTV)**

CCTV is Chinese state television station, which presently has 12 TV channels including news integration channel, agriculture, children, military science, education channels which covers almost all aspects of social lives. It has more than 1.1 billion audiences which takes up to 90% of the whole population in the country. CCTV produces programs in different foreign languages, which are transmitted to outside world via satellites.

#### ? **China National Radio (CNR)**

China National Radio is state broadcasting station, which is one of the most important and popular medias in china.

China National Radio has 8 programs, transmitting 156 hours everyday through manmade satellites. It sets up 39 reporter station and offices throughout the country (provinces, autonomous regions, municipalities directly under the Central Government, special municipalities, Hong Kong and Macao) and establishes business relations with more than 40 foreign broadcasting organizations.

#### ? **Environment Education Center, People's Education Press Environmental Education Center of People's Education Press (EEC-PEP)**

For further developing and perfecting sustainable development education system, which should be tightly concerned with present teaching materials in middle schools and elementary schools, People's Education Press, Cooperating with World Wild Fund, set up EEC in 1998. EEC will develop and perfect 3 projects step by step in the following years: a) researches on theory and practices of sustainable education courses and teaching materials; b) developing and publishing sustainable education development resources; c) providing sustainable development training for teachers.

#### ? **Friends of Nature Friends of Nature (FON)**

Founded in March 1994, Friends of Nature is the first non-government environment protection organization in China. The major initiator and incumbent president is professor LIANG CONG JIE who is a member of Chinese People's Political Consultative Conference and a tutor in Chinese Civilization College. The major task of FON is to launch mass environment education, sparkplug green civilization, form and spread green civilization with Chinese characteristics, promote

Chinese environment protection. FON spreads green consciousness to society especially to hobbledehoy by giving them environment education through all kinds of activities including environmental lectures, publications, and mass medias.

## **2.5. Industries and organizations**

A number of industries and enterprises have involved in producing and using POPs, which can be seen from table 3.

Generally, based on principles of equality and mutual benefit, industry associations are voluntarily formed by component organs which serve the industry by means of producing, scientific researching, designing, teaching and resources supply.

The major task of industry associations is to serve component enterprises, reflect their voices, protect rights and interests of members, assist government to improve industry management, improve technical advance and industry update by focusing on economic benefits and industry restructuring.

The primary mission of industry associations include the following matters: taking statistics and investigations throughout the industry, establishing statistics and investigation system, responsible for information collection, analysis and release, promoting domestic and international technical exchange and cooperation, organizing exhibitions, technique expos and academic reports ,etc, organizing researches and investigations on future development of the industry; giving advices and ideas to governments on legislation and economic policies ;participating in devising and amending national standards and industry standards, supervising the implementation of those standards ;reflecting requests of members, protecting their rights and interests ;originating industry publications ,providing counseling services; organizing related vocational training ,etc.

Industry associations are bridges and ligaments to spread information and pull wires between government and enterprises, enterprise and enterprise, enterprises and general public. As to governments, on one hand, associations protect enterprise's rights and interests, reflecting members' voices in time, on the other hand, related associations put forward feasible proposals to help government to constitute and implement laws, regulations and standards by organizing correlative specialists and technicians to conduct investigations, national guidelines ,policies ,laws and regulations also can be popularized to enterprises by industry association. As to enterprises, associations can forward the requests and demands of governments and public to enterprises, offer information on marketing promoting and international cooperation, offer help to settle some problems.

With the reform of Chinese economic system going deeper, the government has canceled some administrative departments, part of whose functions has been assigned to industry associations.

Chinese government has strong ties with industry associations. For example, the department of industry association in State Economic and Trade Commission (SETC) directly takes charge of 15 industry associations, instructing associations to carry out their businesses according to the Charter. The 15 industry associations are entrusted to take charge of other subsidiary associations. Every association has its equal corporate status and each takes on its own civil liability. Both associations and their subsidiary associations are responsible to SETC. The former only supervise the latter in the range of the function scope entrusted by SETC. The former has no power to intervene subsidiary associations' businesses, which are carried out under their Charters.

Some other government authorities also set up relevant industry associations, for instance ,Environmental Protection Industry Association is affiliated to State Environmental Protection Administration. China Association of Urban Environmental Sanitation has been set up by the Ministry of Construction.

**Table 3: Enterprises and related organizations involved in POPs pollution sources (producing/ engendering, using)**

Sorts of pollution sources	Involved industries and fields	Industry status	Related main organizations	Circumstances of related organizations
Rubbish treatment (living rubbish\ industry rubbish\ medical rubbish)	Environmental protection industry		<b>China Association of Environmental Protection Industry</b>	Founded in December, 1984, it is subordinate to State Environmental Protection Administration (SEPA). Presently it has 39 group members (environment industry associations at levels of province and provincial capital). Over 500 unit members, 7 specialty commissions such as Solid waste Treatment and Reuse Commission etc.
	City sanitation Industry	Some municipalities have wastewater treatment plants. China roughly has more than 40 incinerators which have a treatment capacity over 13200 tons each day	<b>China Association Of Urban Environment Sanitation</b>	Founded in 1992, it is subordinate to Ministry of Construction (MOC).
	Medical industry			
Produce and use chemicals or consumables	Petroleum industry		<b>China Petroleum and Chemical Industry Association</b>	Founded in 28 April 2001, it is subordinate to State Economic & Trade Commission (SETC). Presently it has 41 specialty commissions and more than 200 membership units, whose business scale covers around 70% of the overall industry.
		There are nearly 200 chlorine and alkali enterprises in china.	<b>China Chlorine Alkali Industry Association</b>	Founded in 1981. China Petroleum and Chemical Industry Association (CPCIA) manages it on behalf of SETC. It has now 246 membership units throughout the country.
		There are nearly 2000 pesticide producers in china.	<b>China Pesticides Industry Association</b>	CPCIA manages it on behalf of SETC. Currently It has 246 membership units whose output and total sale take 85% market of the overall industry.
		Nearly 600 dye production enterprises in china till the end of 1999.	<b>China Dye Industry Association</b>	CPCIA manages it on behalf of SETC.

	Paper industry	There are about 4000 paper and chipboard production enterprises in china in 2001.	<b>China Paper Industry Association</b>	China Light Industry League (CLIL) manages it on behalf of SETC.
	Textile industry	There are more than 18000 textile enterprises in china in 1999.	<b>China National Textile Industry Council</b>	It is subordinate to SETC .
	Leather industry	There are 596 leather production enterprises and 241 fur production enterprises in china in 1998.	<b>China Leather Industry Association</b>	CLIL manages it on behalf of SETC. Founded in 1988, it has 1300 membership units standing for 400 thousands employees.
Steel and other metals production and machining	Iron and steel industry	There are 2997 iron and steel production enterprises in china till the end of 2000, among which there are 37 enterprises whose steel output is more than 1000 thousands tons.	<b>China Steel Association</b>	It is subordinate to SETC and was founded in January 1999. It has 134 group members and 10 individual members. On aspects of output, selling income, and total employees CISA covers respectively 92.6%, 90%, 75% over whole iron and steel industry.
			<b>China Coking Association</b>	China Steel Association (CSA) manages it on behalf of SETC.
			<b>China Waste Steel Use Association</b>	CSA manages it on behalf of SETC. Founded in July 1994, it has 124 membership units.
	Non-ferrous metals industry	There are more than 5000 non-ferrous metals regeneration enterprises in china. The output of regenerated non-ferrous metals covers 25%-30% over all non-ferrous metals industry .	<b>China Non-Ferrous Metal Industry Association</b>	It is subordinate to SETC. It has now more than 400 membership units.
	Machinery industry			<b>China Foundry Association</b>
<b>Confederation of Chinese Metalforming Industry</b>				Founded in 5 July 1986. CMIF manages it on behalf of SETC.
<b>China Heat Treatment Association</b>				Founded in August 1991, CMIF manages it on behalf of SETC. Presently it has around 500 memberships.

			<b>Chinese Association of Automobile Manufacture</b>	CMIF manages it on behalf of SETC. The output of members take 99.9% of overall national output of more than 2.3 million in 2001.
Electricity generation and heat supply	Electric power industry		<b>China Electricity Council</b>	It is subordinate to AETC. It has more than 900 group members and is a member of the standing committee of Asia & Pacific Electricity Supply Association.
	District heat supply		<b>China City and Town Heating Association</b>	It is subordinate to MOC.
	Methane burning			
Mineral product (cement, lime, tile, glass, vitreous enamel, Ceramic, asphalt	Building and construction material industry	There are more than 200 thousands of enterprises whose average scale is comparatively small, some of which still manufacture by way of handwork or indigenous method.	<b>China Building and Construction Materials Industry Association</b>	It is subordinate to SETC. Has more than ten group members including China Cement Industry Association, China Lime Industry Association, China Building Waterproof Materials Industry Association etc..
			<b>China Cement Industry Association</b>	China Building and Construction Materials Industry Association (CBCMIA) manages it on behalf of SETC. It was founded in 25 February 1987, standing for 4000 cement manufacturers whose output over 600 million tons.
			<b>China Brick and Tile Industry Association</b>	CBCMIA manages it on behalf of SETC. Founded in July 1986, presently it has 3783 membership units, including 408 direct members and 36 members at provincial, regional level.
			<b>China Lime Industry Association</b>	CBCMIA manages it on behalf of SETC.
			<b>China Fiberglass Industry Association</b>	CBCMIA manages it on behalf of SETC. Founded in 1987, including all large-scale and medium-sized enterprises whose production value cover 70% of the whole industry and small major plants cover around 30%.
			<b>China Building Glass and Industry Glass Association</b>	CBCMIA manages it on behalf of SETC.
			<b>China Building Ceramics and Sanitaryware Association</b>	CBCMIA manages it on behalf of SETC. Currently it has 350 members.
	Light industry			<b>China Daily Glass Industry Association</b>

			<b>China Porcelain Enamel Industry Association</b>	CLIL manages it on behalf of SETC. It has now 210 membership units, in which state-owned enterprises take 20% and privately owned enterprises take around 40% joint-stock companies and joint ventures take the rest. Four specialized committee and three centers have been set up in it.
			<b>China Ceramic Industry Association</b>	CLIL managed it on behalf of SETC. Founded in September 1989. Presently it has more than 600 membership units and stands for around 400 thousands of employees.
	Municipal road construction industry		<b>China Municipal Engineering Association</b>	It is subordinate to MOC. It has set up 11 specialized committees.
	Large-scale road construction			
Motor vehicle waste gas emission			<b>China City Taxi Association</b>	It is subordinate to MOC. Founded in 6 December 1986. Authorized employees and temporarily transferred engaged employees in it add up to 31.
			<b>China City Public Transport Association</b>	It is subordinate to MOC.
Burning animal	Cremation	China had 5462 incinerators, which burn 3736540 corpses in 2000.		
Plant burning				
Timber desiccation				
Textile dry-clean				
Cooking				

Smoking				
Using DDT				
Using Chlorine and pesticide	House construction and property Management		<b>China Property Management Association</b>	It is subordinate to MOC.
	Road and water conservancy facilities construction			
Using PCP and PCP-Na Salt	Destroy nail snail	Pentachlorophenol and Pentachlorophenol, Sodium Salt have been widely used in 11 provinces, cities, municipalities in Middle and Lower Reaches of Yangtse River for long time ,which cover 14.8 billion square meters.		
	Timber antiseptis	Pentachlorophenol and Pentachlorophenol, Sodium Salt are allowed to use in the field of crossties antiseptis in china .		



## 2.6. Victim organisations

Generally, on one hand, people in the world are victims of POPs pollution. On the other hand, they are the beneficiaries if *Stockholm Convention* has been fully fulfilled. Thereby, it is hard to give clear definition for victim help organizations. The following are two organizations to be given as examples.

### ? **China Consumers' Association (CCA)**

Authorized by the State Council, CCA was founded in December 1984. CCA is a nation-wide social organization with corporate status. Sponsored by governments and other social bodies, it aims to supervise commodities and services for protecting consumers' rights and interests.

CCA is under leadership of the Council. The directors of the council are chose by consultation among consumer representatives, and representatives from relevant government departments, NGOs, mass medias, and local CCAs.

Presently, there are 3138 consumers associations at county level or above, among which 31 associations are at level of province, autonomous region, municipality directly under the Central Government. There are also 156 thousands of network organizations such as supervising stations and contacting stations having been set up in village committees, resident committees, colleges and universities, enterprises. The number of voluntary supervisors and right protectors is about 100 thousands.

According to *Law of the People's Republic of China on Protecting Consumers' Rights and Interests*, China Consumers Association and other associations at all levels directed by CCA fulfill 7 functions as follow: (a) release consumption information and offer counseling to consumers. (b) participate in supervising and examining activities conducted by relevant administrative departments. (c) reflect consumers' rights and interests to relevant administrative department , put forward useful advises. (d) accept and hear cases from consumers ,take intercession and investigation into the affair. (e) cooperate with authentication organizations to test qualities of commodities and services. (f) support victims to raise lawsuits g) reveal and criticize the behaviors damaging consumers' legal rights and interests through public medias.

Standing for consumers, CCA actively takes part in laying down dozens of laws, rules, standards to protect consumers' rights and interests and reflect public opinions to governments, exerting active effect in perfecting legislation.

Till the end of 2000, CCA and local CCAs have accepted and heard 5405630 cases from consumers, the settlement rate of which reached 96.9%, retrieving economic lose around 3.06 million RMB for consumers.

Popularization and education are major means to spread consumption knowledge and conduct protecting activities. Especially in the period around 15 March --International Consumer Rights Day, together with local CCAs, China Consumers Association conduct protecting activities at all round.

### ? **Center for Legal Assistance to Pollution Victims**

Beijing Environmental Justice Assistance Center was founded in 1998, which aims to conduct special researches on environment law, promote international exchange, provide training for relevant involvers, and help environment-related victims. BEJAC is mainly made up of enthusiastic concurrent specialists, scholars from universities and other research institutes. Its working areas include: a) set hotline and complaining office for pollution victims. b) Together with 'China Environment News' to launch "lawyer mailbox". c) Cooperate with relevant law organizations in undertaking environment lawsuits .d) carry out special researches on environment

legislation and law enforcement, put forward countermeasures to relevant agencies. e) Provide professional training to law executives and judges

### **3. Obstacles and Difficulties Confronted by POPs Stakeholders**

Stockholm Convention aims to reduce and finally eliminate POPs emission to protect people's health and the environment. A number of obligations have been claimed to contracted parties which can be summarized as follows: (1) generic obligations: designate the state liaison organization; make, execute and update the state implementation plan; promote information exchange among general public, strengthen cognition and education on POPs pollution; conduct researches on POPs and their substitutes; submit reports to the General Conference, which should contain measures having been taken, effects and trading data of deliberately produced POPs.(2) for deliberately produced POPs: the target is to eliminate all deliberate emission of POPs.(3) for unconsciously produced POPs: the target is to continuously reduce and finally eliminate the emission under certain circumstances.

To fulfill the commitments, along with enough capital investment, contracted parties further need to possess many other competences including good administration, competitive research capacity, active involvement of pollution industries, and the widest public participation. Being a developing country, Stockholm Convention stakeholders in China are facing many challenges.

#### **3.1. Supervision and Management**

It can be seen from the above description that, for both deliberately produced POPs and unconsciously produced POPs, China has corresponding administrative departments to take responsibilities.

However, the administrative capacity of Chinese government is still far from meeting the Convention requirements, which can be further articulated in the following aspects:

(1) The administrative capacity is limited. Although multi-departments being involved in POPs supervision and management, the lack of staff is a serious problem due to the current government restructuring. Furthermore, since the professional training mechanism has not been established so far, many administrators still cannot qualify to deal with POPs- related problems. China is one of the largest countries in producing and consuming chemicals, and Chinese metallurgy industry and energy industry, both of them give rise to POPs byproducts, have reached quite large scale. So there is an evident contrast between limited administrative capacity and huge management demand.

(2) Badly lack of outlay for POPs supervision and management. China is a developing country and governments' administrative expense is seriously deficient. The huge capital investment needed to fulfill the Convention have hindered China to take effective measures in some fields.

(3) Supervision and management technologies cannot keep pace with current situation. For instance, environmental management and scientific researches are on the basis of environmental monitoring which is a powerful weapon to strengthen law enforcement. However, presently, POPs monitoring is limited to a few research projects. There is no routine monitoring for any kind of POPs in any kind of environmental mediums, which makes supervision and management lack of solid base.

(4) The hardship of coordinating conflict interests among agencies due to the unclear jurisdiction divisions.

#### **3.2. Research and Development**

Article 11 of the Convention states: The Parties shall, within their capabilities, at the national and international levels, encourage and/or undertake appropriate research, development, monitoring

and cooperation pertaining to persistent organic pollutants and, where relevant, to their alternatives and to candidate persistent organic pollutants, including on their: (a) Sources and releases into the environment; (b) Presence, levels and trends in humans and the environment; (c) Environmental transport, fate and transformation; (d) Effects on human health and the environment; (e) Socio-economic and cultural impacts; (f) Release reduction and/or elimination; and (g) Harmonized methodologies for making inventories of generating sources and analytical techniques for the measurement of releases.

It can be seen that researches and developments concerning the Convention are multi-aspect related. Some of them, for instance, the researches of POPs substitutes and stored POPs harmlessness treatments, have provided solid foundation for the fulfillment of the Convention. However, since Chinese research capacity is still very weak, the POPs-related researches in China are underdeveloped. Some research fields even still remain blank.

Under planned economy, segmentation among different industry sectors, estrangement among regions and obstruction of information communication have led Chinese research institutes to a number of consequences like repeating construction at low level, narrow scale and low competence.

Meanwhile, with the restructuring and reform going on, some research institutes find themselves seriously short of outlays and hard to carry out researching projects because of the cancellation of financial aid from governments.

### **3.3. Popularization, Awareness and Education**

Article 10 of the Convention states the requirements for popularization, awareness and education: Each Party shall, within its capabilities, promote and facilitate: (a) Awareness among its policy and decision makers with regard to persistent organic pollutants; (b) Provision to the public of all available information on persistent organic pollutants, taking into account paragraph 5 of Article 9; (c) Development and implementation, especially for women, children and the least educated, of educational and public awareness programmes on persistent organic pollutants, as well as on their health and environmental effects and on their alternatives; (d) Public participation in addressing persistent organic pollutants and their health and environmental effects and in developing adequate responses, including opportunities for providing input at the national level regarding implementation of this Convention; (e) Training of workers, scientists, educators and technical and managerial personnel; (f) Development and exchange of educational and public awareness materials at the national and international levels; and (g) Development and implementation of education and training programmes at the national and international levels. 2. Each Party shall, within its capabilities, ensure that the public has access to the public information referred to in paragraph 1 and that the information is kept up-to-date. 3. Each Party shall, within its capabilities, encourage industry and professional users to promote and facilitate the provision of the information referred to in paragraph 1 at the national level and, as appropriate, subregional, regional and global levels. 4. In providing information on persistent organic pollutants and their alternatives, Parties may use safety data sheets, reports, mass media and other means of communication, and may establish information centres at national and regional levels. 5. Each Party shall give sympathetic consideration to developing mechanisms, such as pollutant release and transfer registers, for the collection and dissemination of information on estimates of the annual quantities of the chemicals listed in Annex A, B or C that are released or disposed of.

Chinese central government supports and encourages public participation, and makes efforts to build and perfect the public participation system. It is a huge project to improve consciousness of concerned agencies and the general public on POPs. The main characteristics are:

(1) China has 1.3 billion of population and 0.8 billion are rural farmers with low level education. Furthermore, the pollution and hazard of POPs is potential in a long term. People still know little about it and thereby lack of self-safeguarding consciousness.

(2) China is transforming from planned economy to market economy. On some aspects, the management of governments is not as tight as before. Information communication between governments and enterprises is not good enough.

(3) China is a developing country and many industries are still underdeveloped. Small or medium scale enterprises with lagged technologies and simple equipments are the mainstream in these industries.

#### **4. Prior projects and their cost assessment required in the NIP development**

See the report by Professor LI Zhengyu

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## **Appendix 6**

# **Initial Assessment on POPs Monitoring and Analysis Laboratories in China**

Unedited draft English text of final report in Chinese

**CRS-SEPA  
Dec. 2002**

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## **1. Preface**

The *Stockholm Convention on POPs* (the *Stockholm Convention* for short) requires every signatory state to work out its National Implementation Plan (NIP) within two years after the convention comes into effect. The Chinese government signed the convention on May 23, 2001 and is now undergoing the procedures of its formal approval.

As a preliminary preparation for the compiling of its NIP, the GEF PDF-B project entitled "Preliminary assessment to identify the requirements for developing a National Implementation Plan in the People's Republic of China as a first step to implement the *Stockholm Convention on POPs*" executed by the United National Industrial Development Organization (UNIDO) was approved on 20 December 2001.

"Comment on the Stakeholders in China for the implementation of the *Stockholm Convention*" is a sub-project of the above mentioned project, which aims at a detailed comment on the stakeholders in the China's implementation of the *Stockholm Convention*, as well as setting up the priority projects to be constructed for the compilation of China's NIP.

According to the working outline, stakeholders concerning the implementation of the *Stockholm Convention* include the state, provincial/municipal governments, enterprises, collectively owned or privately owned laboratories for monitoring and analysis, research institutions, law enforcement bodies, institutions of public health, non-governmental organizations and other involved social groups.

Through the introduction by Foreign Economic Cooperation Office (FECO) of SEPA who is the organizer the project, Ms. ZHOU Hong was invited as an expert for the project and a subcontract was established between the UNIDO and Chinese representative Ms ZHOU Hong as a part of the project. The Aim of the subcontract is to make a review for the *Stockholm Convention* stakeholder and propose a concerned capacity building priority projects.

Through questionnaires, consulting concerned internet pages and other information sources as well as participating in relevant meetings and conferences and direct inquires, the author has collected large amounts of data, which has been sorted out, analyzed as a basis for this report.

This report contains four parts, namely: 1. Preface; 2. A detailed introduction to China's POPs monitoring and analysis laboratories; 3. An analysis on the challenges and problems China's POPs monitoring and analysis laboratories are facing; and 4. Prior projects for the compilation of China's NIP and their costs.

The report is one of the five research outcomes expected by the project job description. The others are: *The Preliminary National Stakeholder Digital Directory*; *The Preliminary National POPs Laboratories Digital Directory*; *Primary Review Report on China's POPs Stakeholder*; *Report on the Priority Projects in China for POPs Monitoring and Analysis*.

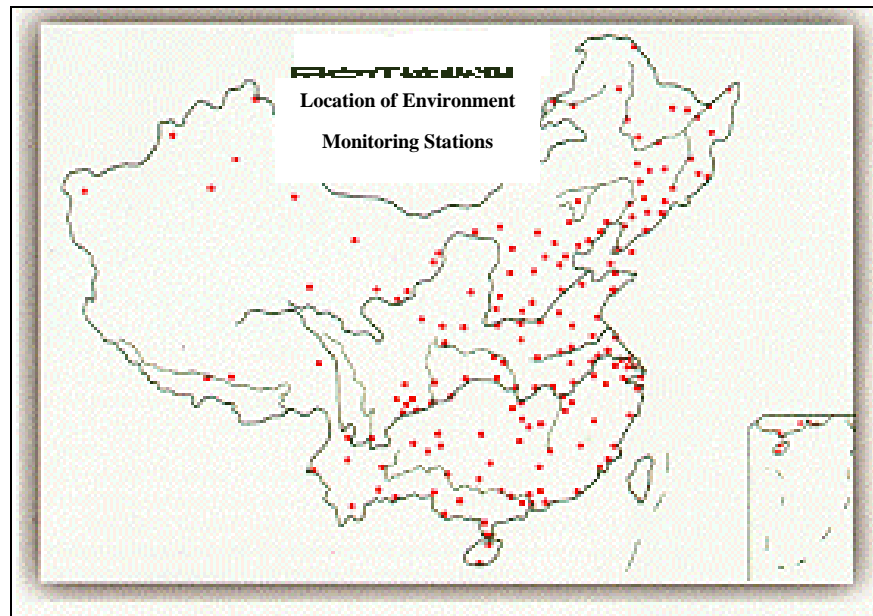
## **2. Current Situation of POPs Monitoring and Analysis Institutions**

### **2.1. System of monitoring institutions for environmental protection**

#### **2.1.1. Organization**

The environmental monitoring system has been set up gradually since the first national meeting on environmental protection held in 1973. By early 1990s monitoring stations have been set up at four levels—national, provincial (municipal, and autonomous regional), city (prefecture) and county. Environmental monitoring stations have been also set up in a number of townships where conditions are mature. As a result, a environmental monitoring system consisting of over 1,900

centers/stations was formed (Fig. 1).



**Fig. 1 Location of Environment Monitoring Stations**

(1) At the national level, that is China's National Environmental Monitoring Center

China's National Environmental Monitoring Center is an institution directly affiliated to the State Environmental Protection Administration (SEPA). It provides technical support, technical supervision and technical service for the environmental supervision management of the SEPA. It plays a role as the network center and training center of national environmental monitoring and provides professional management and offers guidance for the national environmental monitoring system:

(a) To be responsible for formulating national monitoring development program, technical schemes, technical norms, technical standards and annual plans, and provide guidance to their implementation by the environmental monitoring stations at various levels.

(b) To be responsible for collecting, verifying and managing the national environmental monitoring information and environmental statistics data; to be responsible for compiling *China's Environmental White Book*, "National Environmental Status Report", the "Annual Report of National Environmental Statistics", "National Environmental Quality Report" and "Report on the Status of China's Major Pollution Sources Discharge".

(c) To be responsible for the management of China's Net of Global Environmental Monitoring System, China Branch Center of East Asia Acid Deposition Monitoring Network and national environmental monitoring networks and provide guidance to the construction of the network. To be responsible for the management of important river basin and regional environmental monitoring networks and to be responsible for formulating project programs of capacity building of national, important river basins and regional environmental monitoring networks and provide guidance to the implementation of the programs.

(d) To organize the monitoring over the atmosphere, noises, water, solid waste, ecology and offshore zones in the whole country; to be responsible for conducting research of the technical methods in environmental monitoring and analysis and standardized technical management in the whole country; to amend relevant environmental quality standards and be responsible for the daily



work of the National Environmental Monitoring Technical Committee.

(e) To guarantee and control the quality of the monitoring carried out by the national environmental monitoring system; to be responsible for the technical management of the metrological authenticity of the second level environmental monitoring stations; to be responsible for the Quality Supervision and Test Center of Environmental Monitoring Instrument of the SEPA.

(f) To be responsible for formulating the National Environmental Monitoring Technical Training Plan, organizing and providing guidance for its implementation, and for carrying out international environmental monitoring technical exchanges and cooperation.

(g) To be responsible for the technical and daily work of quantitative assessment of comprehensive environmental treatment in major cities and the appraisal of national environmental model cities and to be responsible for the supervision and monitoring entrusted by the SEPA.

(h) To offer technical guidance for emergent monitoring in case of serious pollution accidents in the country, to carry out investigation of such accidents, and to be responsible for pollution arbitration as is entrusted by the SEPA.

(i) To be responsible for the work of Ecological and Environmental Monitoring Center of the Three Gorges on the Yangtze River, to provide guidance to the ecological and environmental monitoring in the Three Gorges Reservoir area and formulate annual ecological status report.

Under China's Environment Monitoring Center are its general office, human resources department, office of the chief engineer, office of comprehensive appraisal, office of environmental statistics, offices of supervision technology respectively over water bodies, the atmosphere, the ecosystem, and physical monitoring. The center has a total staff of nearly 100, of whom 93% are technical personnel and those with senior titles account for 40%.

Relying on its high quality staff and by using sophisticated equipment, plus its advanced scientific and technical level and strict administration, the center has been collecting and pooling various monitored data through the country, giving comprehensive appraisal of the country's environmental situation, ensuring and guaranteeing the quality of the nation's environmental monitoring system, and providing technical guidance and coordination to the environmental monitoring network. The center has played the role of the nation's center of environmental monitoring technology, information, networks, and personnel training, providing efficient technical service for the SEPA in its decision making concerning environmental issues.

Professionally, China's Environment Monitoring Center is directly under the leadership of the Department of Planning of the SEPA.

(2) The secondary level, that is, the provincial/municipal level

Major functions of central environmental monitoring stations at this level include the following.

(a) To take part in the compiling of environmental monitoring plans and annual plan of the province/municipality.

(b) To collect, sort out, and pool monitored environmental data to be used for compiling monitoring reports and provincial/municipal annual environmental pollution reports.

(c) To give professional and technical guidance to environmental monitoring stations under them and to be responsible for professional organization and coordination of its monitoring network, and to organize concerned technical exchanges and personnel training and professional testing.

(d) To guarantee the quality of environmental monitoring in the province/municipality.

(e) To carry out research on the assessment of provincial environmental standards and monitoring techniques, to compile provincial environmental quality reports.

(f) To be in charge of comprehensive environmental investigations and to arbitrate disputes concerning environmental pollution.

(g) To take part in the formulation and updating of provincial/municipal environmental standards, and provide basis and information for the formulation, updating and checking of national environmental standards.

(h) To take part in the investigation of incidents concerning environmental pollution and the examination of assessments of environmental impact for construction projects and the checking of monitoring of environmental benefit of pollution treatment as authorized by environmental administrative departments.

(3) At the third level, that is, the city level (cities with districts under them)

The main functions of monitoring stations at this level include:

(a) To carry out regular monitoring over environmental elements such as the atmosphere, water bodies, soil, organisms, noise, radiation, etc. as required by the state; to collect, sort out, pool, and file data obtained through monitoring and regularly report city environmental quality and make annual report on the state of pollution to the environmental administrative department of the same level and its superior stations/centers.

(b) To monitor regularly and irregularly over discharge of pollutants and establish concerned files to strengthen administration over pollution sources in the city, which will serve as the basis for collecting pollutants discharge fees (departments in charge collection of such fees do not have their own monitoring stations).

(c) To take part in the formulation of city environmental monitoring plans and carry out actual monitoring.

(d) To be responsible for city environmental quality assessment and take part in the compiling of report on city environmental quality and annual environmental report.

(e) To be in charge of the organization and coordination of city environmental monitoring network, and to organize relevant technical exchanges and personnel training.

(f) To study problems concerning field work, sampling, distribution, and the transportation, store, and analysis of samples, so as to promote continued development of monitoring techniques.

(g) To take part in the formulation and updating of local and national environmental standards and technical norms. New techniques and methods in environmental monitoring.

(h) To take part in the investigation of accidents of pollution and provide technical arbitration for disputes caused by environmental pollution.

(4) The fourth level, that is the county level

The major functions of environmental monitoring stations of the county level are:

(a) To formulate plans and carry out regular monitoring over the county's environment according to the standards set by the state; to report regularly to their superior stations/centers data obtained through monitoring, and compile annual report on the county's environmental quality.

(b) To monitor regularly and irregularly discharge of pollutants in the county and establish concerned files; to check the implementation of environmental protection laws and regulations, and to provide data for collecting fees of pollution discharge;

(c) To carry out monitoring tasks as required by environmental protection administrative departments.

(d) To take part in the investigation of accidents of pollution in the county, and provide data for the arbitration of disputes over pollution.

(e) To publicize the principles and policies of environmental protection, to organize and mobilize the masses to take part in environmental monitoring and form a mass network for such monitoring.

The SEPA established the “National Environmental Quality Monitoring Network (NEQMN), which consists of over 200 stations through optimized selection. Items monitored include the atmosphere, surface water, noises, acid rain, radiation and the ecosystem.

In order to strengthen the administration over river areas, the SEPA has successively established since 1994 the environmental monitoring networks respectively over the Yangtze River basin and the three gorges, Huaihe River basin, the Taihu Lake basin, and the coastal areas.

### **2.1.2. Equipment and facilities**

As of 1998 the environmental protection system in China owned equipment and facilities with a total original value of 650 million *yuan*, and there are 1,257 instruments like atom absorbers, ion chromatographies, gas chromatographies, liquid chromatographies, and GC-MS. Investigation over the 178 stations directly under national control reveals that their monitoring instruments have a total original value of 337 million *yuan*, accounting for 51.9% of the national total, of which 661 are large instruments. To enhance the administration over the environmental monitoring instruments and to make full use of them, an administrative regulation has been worked out, which stipulates specifically how such instruments are to be used, managed, allocated, and renewed. See Table 1 for the allocation of instruments at monitoring stations at different levels. The installation of large instruments like GC-MS and plasma is determined by actual demands.

China’s input in environmental monitoring capacity in 1998~2002 reached 1.983 billion *yuan*, 1.9 times that of the total input of the twenty-five years before 1997, thus greatly enhancing the nation’s comprehensive monitoring capacity. 179 cities in China have now set up 474 automatic atmospheric monitoring systems. 80 automatic water quality monitoring systems have been set up in major river basins, and nearly 2,000 on-line monitoring equipment have been set up at major pollution sources.

**Table 1 Allocation of Environmental Monitoring Instruments  
at Stations of Different Levels**

	Instrument Levels of stations	Quantity			
		Level I	Level II	Level III	Level IV
1	GC-MS	1	1	As required	
2	ICP-AES	1	1	As required	
3	AFS	1	1	As required	
4	Infrared Spectrophotometer	1	1	As required	
5	HPLC	1	1	1	
6	GC	2	2	1	As required
7	IC	2	1	2	As required
8	AAS	2(One GFAAS)	2(One GFAAS)	2(One GFAAS)	1
9	Analytical balance (0.1mg)	3	4	3	1
10	Analytical balance (0.01mg)	1	1	1	
11	Vis Photometer	3	4	4	2
12	UV Photometer	2	2	2	
13	Bioluminescence photometer	2	1	As required	
14	Non-disperse infrared oil analyser	2	1	1	As required
15	Hg meter	2	1	1	1
16	DO meter	2	2	3	1
17	COD meter	2	2	3	1
18	Tone level meter	2	2	4	2
19	Vibration meter	2	2	3	As required
20	Field intensity meter	2	1	1	As required
21	Conductometer	2	3	3	1
22	Turbidimeter	2	2	2	1
23	Biomicroscope	3	2	2	As required
24	Constant temperature room	1	1	1	As required
25	BOD culture case	2	2	3	1
26	Air sampler	6	8	10	6
27	TSP sampler	6	8	10	6
28	PM <sub>10</sub> sampler	6	8	10	As required
29	Soot sampler	3	3	4	2
30	Soot meter	2	2	2	1
31	Smoke sampler	2	2	2	1
32	Smoke meter	2	2	2	1
33	Polarograph				1
34	Sulfur in coal analyser	1	1	1	
35	Ringlman soot meter	2	9	4	9
36	Water sampler	4	4	4	2
37	Velocity of flow meter	2	4	4	2
38	Precipitation sampler	2	3	6	2
39	Refrigerator freezer	10	10	5—10	2
40	Copier	2	2	1	As required
41	Computer typewriter	9	1	1	As required
42	Pocket Computer	20	10	8	2

43	Environment monitoring automobile	3	3	2—3	1
44	Meter for black level of smoke from diesel	1	1	1	As required
45	Auto air sampling system (set)	As required	As required	As required	
46	Auto water sampling system (set)	As required	As required	As required	
47	Equipment for emergency monitor	1	1	1	1
48	Meter for emission from automobile	1	1	2	1
49	Fax	1	1	1	As required
50	Long-distance communication equipment	1	1	1	1
51	Video camera	1	1	As required	
52	TOC	1	1	1	
53	Multi-function water meter	2	9	3	1
54	Element analyser	1	1	As required	
55	Sampling boat		As required	As required	

### 2.1.3. Basic monitoring capacity

Table 2 lists the basic capacity of monitoring stations at different levels, which is judged in light of the standards as is set in the following: *Methods for the Atmosphere and Waste Gases Monitoring and Analysis*, *Methods for Water and Waste Water Monitoring and Analysis*, and *Technical Norms for Environmental Monitoring (Noises)*. In principle, monitoring stations at the first and secondary levels should have the capacity to carry out the monitoring and analysis of all the listed items, of which 61 items concern the atmosphere and wasted gases, 12 concern precipitation, 71 water and waste water(including DDT), 12 solid waste matters under soil (including organic chlorine pesticides), three types of items for aquatic life, and 6 vibration noises. Stations at the third level should have the capacity to carry out monitoring according to their respective specific tasks. As for stations at the fourth level, besides items required (as is underlined in the table), they should also carry out monitoring according to the characters of their local pollution.

It can be seen from Table 2 the environmental protection monitoring network has the capacity to monitor DDT in water and soil, but none of the 12 items of POPs is listed in the range of normal monitoring.

**Table 2 Basic Capacities of Environmental Protection Monitoring Stations**

Monitoring Range	Items Monitored
Atmosphere and waste gases (61 items)	CO; <u>NO<sub>x</sub></u> ; <u>CO<sub>2</sub></u> ; <u>Ammonia</u> ; <u>Cyanide</u> ; Photochemistry oxidizer; <u>Ozone</u> ; <u>Fluoride</u> ; <u>P<sub>2</sub>O<sub>5</sub></u> ; <u>SO<sub>2</sub></u> ; <u>Rate of sulfate digestion process</u> ; Sulfuric acid mist; <u>H<sub>2</sub>S</u> ; CS <sub>x</sub> ? Carbon bisulfide (CS <sub>2</sub> ); Chlorine (Cl <sub>2</sub> ); Hydrogen chloridized(HCl); Chloride chromic acid mist; Hg; Total hydrocarbon and non-methane hydrocarbon; Aromatic hydrocarbon(Benzene hydrocarbon); Phenylethylene; Benzo[a]pyrene; Methano( CH <sub>2</sub> OH; Formaldehyd( CH <sub>3</sub> ); Low molecular weight aldehyde; Acrolein; Acetone; Carbonyl chloride; Asphaltum smook; Phenols; Nitrobenzene; Aminobenzene; Pyridine; Acrylonitrile; Chloroethylene; Chloroprene; Epichlorohydrin; Methyl parathion; Dipterex; Methyl isocyanate; Diazane andmeta-dimethyl diazane; <u>TSP</u> ; <u>PM<sub>10</sub></u> ; Dust fall; Be; Cr; Fe; Se; Sb; Pb; Cu; Zn; Mn; Ni; Cd,

	As; <u>Soot and industrial dust</u> ; Ringelman soot
Precipitation (12 items)	<u>Conductivity</u> ; $\text{SO}_4^{2-}$ ; $\text{NO}_2^-$ ; $\text{NO}_3^-$ ; <u>Chloride</u> ; <u>Fluoride</u> ; Ammonium; K; Na; Ca; Mg
Water and waste water (71 items)	<u>Water temperature</u> ; <u>Current quantum</u> ; <u>Color</u> ; <u>Odor</u> ; <u>Turbidity</u> ; <u>Transparency</u> ; <u>pH</u> ; <u>Residue</u> ; <u>Mineralization</u> ; <u>Conductivity</u> ; <u>Oxidation-reduction potential</u> ; Ag; As; Be; Cd; $\text{Cr}^{6+}$ ; Cu; Hg; Fe; Mn; Ni; Pb; Sb; Se; Th; Ur; Zn; K; Na; Ca; Mg; <u>Total hardness</u> ; <u>Acidity</u> ; <u>Alkalinity</u> ; $\text{CO}_2$ ; DO; $\text{NH}_4^+-\text{N}$ ; $\text{NO}_2^--\text{N}$ ; $\text{NO}_3^--\text{N}$ ; <u>Kjeldahl Nitrogen</u> ; Total Nitrogen; <u>P</u> ; <u>Chloride</u> ; <u>Fluoride</u> ; <u>Iodide</u> ; <u>Cyanide</u> ; <u>Sulfate</u> ; <u>Sulfide</u> ; B; <u>Silicon dioxide(fusile)</u> ; <u>Residual chlorine</u> ; <u>COD</u> ; <u>Permanganate index</u> ; <u>BOD<sub>5</sub></u> ; <u>TOC</u> ; <u>Mineral oil</u> ; <u>Benzene hydrocarbon</u> ; <u>PAHs</u> ; <u>Benzo[a]pyrene</u> ; <u>Volatile halohydrocarbon</u> ; <u>Chlorobenzene</u> ; <u>HCH</u> ; <u>DDT</u> ; <u>Organic Phosphorus Pesticide</u> ; <u>Organic Phosphorus</u> ; <u>Volatile Phenols</u> ; <u>Formaldehyde</u> ; <u>Acetochloral</u> ; <u>Aminobenzene</u> ; <u>Nitrobenzene</u> ; <u>Anionic synthetic detergent</u>
Solid waste matter under soil (12 items)	<u>Hg</u> ; As; Cr; Cu; Zn; Ni; Pb; Cd; <u>Sulfide</u> ; <u>Organic Chlorine Pesticide</u> ; <u>Organics</u>
Aquatic life (3 items)	<u>Aquatic community</u> ; <u>Aquatic bacterial test</u> ; <u>Aquatic toxicity test</u>
Vibration noises (6 items)	<u>Regional environmental noise</u> , <u>Communication noise</u> , <u>Noise sources</u> , <u>Plant area noise</u> , <u>Construction noise</u> , <u>Libration</u>

#### 2.1.4. Administration

To ensure the accuracy, preciseness, comparability, representativeness, and integrity of the data obtained through monitoring, the administration over environmental monitoring system is to be enhanced, basically through the following:

(1) To optimize the distribution of sampling points and establish a wholesome monitoring system.

Optimal monitoring points over the atmosphere and monitoring sections of water bodies have been selected as sampling points, which are set up as norms not to be easily changed.

As for the methods used in monitoring, a system has been initially established, which consists of three types:

(a) General methods to be used throughout the nation: Such general methods are based on comparatively mature advanced analysis methods through screening, and repeated tests by many laboratories and have been proved to be applicable and can be popularized throughout the country. They include: “*Analysis Methods of Monitoring over Water and Waste Water*” (3<sup>rd</sup> edition, 1989, covering 91 items and 216 monitoring methods), “*Analysis Methods of Monitoring over Air and Waste Gases*” (3<sup>rd</sup> edition, 1990, covering 80 items and 148 monitoring methods), “*Methods for Monitoring and Analyzing the Hazardous Properties of Industrial Solid Waste Matters*” (covering the differentiating of six hazardous properties, 14 hazardous matters and 40 monitoring methods), “*Biological Methods in Monitoring the Atmospheric Environment*” (1993 edition), and “*Handbook for Aquatic Organisms Monitoring*” (1993 edition)

(b) National standard methods (GB): Unified general methods become national standard methods after standardization and undergoing necessary procedures, which now number over 150.

(c) Experimental (not unified) methods: Methods locally or departmentally needed but not included in general or national standard methods, which are established through experiments by concerned institutions.

(2) To ensure the quality of monitoring.

(a) To formulate regulations to ensure the quality of environmental monitoring, and to ensure the realization of aims as set by the “*Handbook to Ensure the Quality of the Monitoring over Environmental Water Quality*” and the “*Handbook to Ensure the Quality of the Monitoring over Environmental Atmospheric Quality*”.

(b) To implement technical norms as is set in the “Technical Norms in Compiling Environmental Quality Reports” and “Technical Requirements and Norms in the Investigation of Industrial Pollution Sources and their Filing”.

(c) To develop series samples for standard environment and carry out quality tracing delivery.

(d) To formulate national regulations of the administration over instruments for environmental monitoring and relevant technical norms and implement laws of measuring.

(e) To establish the certification system for environmental monitoring personnel, and to organize their technical training and testing.

(f) All monitoring stations are to carry out metrological attestation so as to obtain qualification for providing data for the public.

(g) Monitoring stations at different levels are to set specialized institutions or personnel to ensure the quality of their work, and superior stations/centers shall regularly carry out quality administration and check up and test the quality ensuring system over the monitoring.

A comprehensive quality ensuring system from optimal sampling points, to the obtaining and transportation of samples, laboratory analysis, data process, and the compiling of final reports, has initially been set up through the above mentioned means and activities.

(3) To carry out laboratory approval in China.

China’s environmental protection monitoring system has now under it 10 monitoring centers, including those in Shenzhen, Dalian, Shenyang, and Shanghai, which have already begun to implement the *General Requirements for the Competence of Testing and Calibration Laboratories* (GB/T 15481-2000) (idt ISO/IEC 17025: 1999) and have been approved by the state committee for laboratory approval.

China’s entry of the WTO pushes the trend of international laboratory approval. Concerned departments in China have thus worked out its national standard according to similar principles and the stipulation of article 25 of the *ISO/IEC General Requirements for the Competence of Testing and Calibration laboratories* (GB/T 15481-1995), that was then revised to become GB/T15481-2000, which is already carried out by a number of monitoring centers like the one in Shenzhen and has been approved by state.

(4) To have basically realized the digitalization and networking of monitoring data

China’s headquarter of environmental monitoring established a database of environmental quality in 1984, and a database of major pollution sources was established in 1990. Uniformed software databases have been set at the national and provincial levels. Reports on the environmental quality are formulated weekly, monthly, quarterly and there are bulletins, briefs, and special reports. Most provinces/municipalities hand in their annual reports (in the form of software) on environmental quality monitoring to the national headquarters before the end of January, and the report on national environmental quality can be completed before the end of June. At the same time, along with the development of computer techniques, the national headquarters and some provincial stations/centers have started to use the systems like the GIS, the RS, and the GPS in formulating the system of conditions of the nation’s environmental quality, making sound-image reports. In

this respect, the characterization of environmental quality has had rapid development.

### **2.1.5. Work accomplished**

China's environmental monitoring system has done large amount of work in the last twenty years, which can be summed up as the following:

(1) Supervision monitoring, including monitoring of the environmental quality, and pollution sources. Many regions have already set up the system of reporting daily, weekly, and monthly on certain environmental parameters.

**But so far, none of the POPs has been monitored in the normal monitoring of China's environmental protection system.**

(2) Special monitoring, including that carried out for pollution accidents, arbitration, certification testing, and advisory.

(3) Monitoring for research purposes, including that for standardizing monitoring methods, research on pollution rules, background information, and comprehensive assessment.

Among the projects already carried out, the "investigation on pesticide pollution throughout the country" (during the sixth five-year plan) and the "research of priority pollutants in China's water environment to be put under control" (during the seventh five-year plan), and the "investigation of toxic and harmful organic pollutants, assessment of their safety and countermeasures for their control" (2001-1002), as well as the research on the standard methods for toxic and harmful organisms analysis, the revision of the technical norms of monitoring over surface water, waste water, air, and waste gases. All these contribute greatly to the understanding of environmental organic pollution in many regions in China, the standardization of China's environmental monitoring techniques and methods, and the administration over organic pollution in the environment.

## **2.2. Environmental monitoring institutions of other systems**

In addition to environmental monitoring stations established by environmental protection administrations, departments in agriculture, forestry, water conservancy, mining and manufacturing, meteorology, and marine resources have also established a number of monitoring networks at the levels of ministry, province, and professional units. Monitoring stations at these levels are also established by departments in charge of industries, railway, transportation, home service, public health, and the military.

Departments in charge of water conservancy have established hydrological and water quality monitoring systems for the seven major river basins; the State Oceanic Administration has established a national monitoring network over water quality of the seas, which involves 100 departments and governmental organizations; the State Meteorological Administration has set up a national network to monitor acid rain throughout the country, which consists of 81 meteorological stations in cities and counties; the Ministry of Geology and Mining has set up a ground water monitoring network, which consists of 216 stations. The Chinese Academy of Sciences also has its own monitoring network.

### **2.2.1. Maritime system**

The State Oceanic Administration has established a national monitoring network over pollution of the seas, which involves 100 departments and governmental organizations such as the national marine environment monitoring center, monitoring centers of major maritime areas, and centers in coastal provinces and municipalities.



China's marine environmental monitoring system, which consists of maritime stations and the observation system of volunteer ships, was completed and began its operation in June, 2002, forming the initial multi-level marine monitoring system consisting of satellites, airplanes, coastal-based monitoring stations, volunteer ships, and buoys.

Parameters of pollution monitored by this system mainly include nutrients, oil, and heavy metals in the sea water. **None of the POPs is included.**

**So far none of the POPs has been monitored in the normal monitoring by the maritime monitoring system.**

The National Marine Environmental Monitoring Center (NMEMC) (i.e. Institute of Marine Environmental Protection) of China was founded in 1979. It is a public welfare institution responsible mainly for both the professional and technological management for nation-wide marine environmental monitoring and the research on marine environmental protection. Its main tasks and duties are but not limited to:

(a) To formulate the plan for country's national marine environment and ecosystem monitoring and their technical norms and standards, administrative regulations, and to give professional guidance and coordinate within the nation's marine environment monitoring system.

(b) To be in charge of organizational, technical and informational administration over the nation's marine environment monitoring, to carry out routine of the office of the national network, and to be responsible for the assessment and forecast of the marine environment and compile reports on national marine environmental quality.

(c) To be in charge of the professional organization, administration, and technical support for the monitoring over the country's marine environment, pollution, and ecosystem; and to be responsible for large scale investigation of major marine affairs and experiments in professional monitoring.

(d) to study to work out national standards for marine environmental protection, marine ecosystem protection and construction; to formulate standards for the total amount of pollution discharge into the sea and measures for their implementation, plans for tapping offshore oil, emergency program for oil spill on the sea, the process and standard for the assessment of the deterioration of the sea, and the assessment of natural calamities like the red tide and sea freezing.

(e) To provide technical support for the use of the nation's marine areas; to work out the table of marine functions of the seas of the country and their development plans; to formulate the technical norms, standards for the use of China's seas and provide advice of technical arguments and services.

(f) To establish and manage the national data base of marine monitoring and to check up such data; to establish administrative systems over marine environmental monitoring and the use of seas (to be incorporated into the national comprehensive information system).

The NMEMC has 260 scientific and technical staff members, 30% of whom are senior research fellows and 50% have intermediate professional titles. Its fixed assets reach 22 million yuan, of which 8 million yuan is for instruments and equipment for scientific research. The Center is organized into 10 divisions: marine biological resources, marine chemistry, marine environmental dynamics, sea ice, monitoring management, central laboratory, national technical station of sea water administration, the Institute of Marine Engineering Research, Exploration and Design, the hi-tech. development, and marine information and data.

The main projects and programs carried out in recent years include the following: investigation and assessment on marine pollution, history of and prediction on marine pollution, ocean dumping site selections and research on the impact of ocean dumping on marine environment, prevention

and control of marine oil pollution, comprehensive investigation on marine environment, marine development planning and designation of sea functional zones, comprehensive survey on sea island and coastal resources, monitoring and surveillance for major discharge pipes, feasibility survey and environmental impact assessment for construction of sea ports and marine engineering, research on cultivating technology for such sea treasures as crab and prawn and on prevention and control of prawn diseases, and compilation and implementation of the “normative methods for marine monitoring.

### **2.2.2. Water conservancy system**

By making use of the original monitoring system of the former state hydrology resources bureau, the Ministry of Water Conservancy has set up a national water environmental monitoring and assessment research center under its water conservancy system and seven water environmental monitoring centers respectively in the ranges of the Songliao River, the Haihe River, the Yellow River, the haihe River, the Yangtze River, the Taihu Lake, and the Zhujinag River. Water environment monitoring centers have also been set up at the levels of concerned provinces/municipalities and cities, forming a national network of 251 water environment monitoring centers and branch centers under the water conservancy system.

There are 5218 sections for monitoring, which are usually far from cities but near water sources. Items monitored mainly include comprehensive pollution factors like pH values, COD, etc. which are required by the *Standard for the Quality of Surface Water(SL63-94)* as well as heavy metals like total Hg., and geo-chemical factors like K, Na, Ca, and Mei, **but not include any of the POPs.**

**So far none of the POPs is monitored in the normal water resources environmental monitoring system.**

The Water Environmental Monitoring and Research Center, also known as China Institute of Water Resources and Hydropower Research, is the technical center, information center, monitoring network center as well as the personnel training center for water environmental monitoring of the Ministry of Water Resources (MWR). It offers technical support and technical service to the MWR for its implementation of water environmental monitoring and management. It's main duties and research activities are:

- (a) To compile monthly report of the country's water quality and yearbook of the country's water quality.
- (b) To be responsible for the quality assurance and quality control among the national water environmental monitoring system in the Ministry of Water Resources; to produce and research standard reference material for the quality assurance and quality control; to organize research fellows to engage in the establishment, test and verification for monitoring and analytical standard methods to water.
- (c) To be engaged in the research on the changing regular patterns of the country's or regional water environmental quality and its assessment methods, and to forecast the tendency of water environmental quality.
- (d) To research into and develop comprehensive and economical technologies, processes and equipment with high efficiency for waste water treatment and reuse.  
To research and develop the water environmental information management system and working out overall protection designing plans for water resource, aquatic environment and water pollution.

- (e) To enforce water pollution control and eliminate projects on non-point source.
- (f) To conduct personal training and provide advisory services on water environment.
- (g) To undertake priority scientific and technical projects and special tasks mandated by the Ministry of Water Resources

The Center was formally approved and set up in 1984 by the State Science and Technology Commission of China. The Center has 25 professionals, including PhD's, professors, senior engineers, engineers, assistant engineers, and technicians. The Center is composed of 3 research divisions respectively on water treatment, water environmental information system, and water environmental standards and a central laboratory. It has also under it the Bojie Water Company of Environmental Technology.

Up to 20 sets of advanced instruments and equipment are in use in the central laboratory, including an atomic absorption spectrophotometer, gas chromatography, ion chromatography, high performance liquid chromatography, a UV/VIS spectrophotometer, an induce coupled plasma emission spectrometer and so on. The laboratory has passed the meteorological accreditation in 1994 in water environmental monitoring of the national level. It can provide analytical service in various types of samples, which include water/wastewater, soils/sediments, plants/animals, waste products, air/gases, food and commercial goods. 32 standard reference materials in water environmental monitoring are ready to be sold in countrywide.

The center has carried out large amounts of work, such as the appraisal of the nation's water resources quality and the analysis of its trend, quality control of laboratories for water environmental monitoring of the water conservancy system, investigation of the base values of the water quality of major rivers in China, study on the allocation of organic pollutants in key river sections, investigation of the quality of sediments in the main streams of the Yangtze River, the yellow River, and the Huaihe River, the program for water bodies and the construction of water environmental monitoring along the major provincial water borders of the country, the assessment on the impact on the middle and lower reaches of the Hanjaing River by central engineering item of the project of diverting water from the south to the north. It has compiled professional standards like the *Water Resources Standards*, *Methods of Water Quality Analysis*, and *Methods for the Pre-disposal Organic Analysis*. It has also worked out a series of samples which includes 32 water quality parameter.

### **2.2.3. Agriculture system**

Beginning from 1983, the agricultural system started to build its network agricultural environment monitoring, which now consists of the environment monitoring center of the Ministry of Agriculture, 33 provincial centers and over 800 key stations at the city and county levels. Professionally the network under the leadership of the ecological environment division of the department of scientific and technological education of the Ministry of Agriculture.

This network mainly monitors the ecological environment of agriculture and residues of pesticides in agricultural products.

**But so far none of the POPs is monitored by this network.**

The central monitoring station of the Ministry of agriculture takes the lead in this network and provides professional and personnel training for all the other stations under it. The central station now has 25 administrative and technical staff members, of whom 15 have senior professional titles. It also boasts over twenty sets of advanced instruments such as GC? LC? AFS? GC-MS, etc. It has carried out large amounts of effective work in providing technical guidance, investigation of environmental quality, baseline environmental quality assessment, arbitration over incidents caused by pollution, administration of agricultural environmental information, and plans for ecological agriculture.

The range of the work of provincial agricultural environmental monitoring stations include: (1) Testing of pollution of samples of farming water, soil, atmosphere in agricultural areas, sideline products and food; (2) Examination and appraisal of the environmental quality of agricultural bases, including those of pollution-free and green agricultural products, commodity grains, and protected areas of basic farming fields; (3) Appraisal of agricultural and related construction programs; (4) Arbitration of major incidents of pollution of agricultural environment and treatment of such pollution; and (5) Other related professional work, including studies on monitoring techniques, standards and norms, personnel training, technical guidance and advice, and other monitoring work entrusted by the Ministry of Agriculture.

In order to strengthen the protection of agricultural environment, the monitoring over the soil environmental quality of basic farming fields started in the whole country in 1999 in light of the *Notice to Carry Out Monitoring Over the Soil Environmental Quality of Basic Farming Fields* issued by the general office of the Ministry of Agriculture.

In order to implement the Opinions of the State Council on Enhancing the Work for the “Vegetable Basket” Project issued in 2002, the Ministry of Agriculture shall establish a system of agricultural environment monitoring and forewarning at the national, provincial, city and county levels so as to ensure the safety production of agriculture and the quality of agricultural products, especially the treatment and control of agricultural pollution sources in key regions around the Taihu Lake, the Chaphu Lake, the Dianchi Lake, and the Three Gorges along the Yangtze Roiver will, so as to help the government with its decision making and serve agricultural production.

#### **2.2.4. Public health system**

Disease prevention and control centers, institutions of labor health and occupational disease prevention have been set up in China at the national, provincial, city and county levels, which are responsible for agricultural and industrial health, the monitoring over incidents caused by environmental pollution. They are also responsible for emergent treatment of mass poisoning, collecting relevant data and report them to the Ministry of Public Health.

China’s Disease Prevention and Control Centers takes the lead professionally in this network. Its major functions include: (a) To provide scientific basis for the formulation of laws, rules and regulations, policies, standards concerning disease prevention and public health and disease treatment programs, and to provide policy advisory for the administration of public health; (b) To give guidance to the setting up the national public health monitoring network so as to monitor over factors which may harm people’s life, study and work, living environment, and life quality, to carry out monitoring over the public health condition in the environment concerning the fields of nutrition and food, labor, radiation , and schools.

There are twelve institutes (centers) under the center, namely: the institute for the prevention of infectious diseases, the institute for the prevention of viral diseases, the institute for the prevention of parasitic diseases, the center for the prevention and control of VD and AIDS, the center for the prevention and control of chronic non-infectious diseases, the institute of the safety of nutrition and food, the institute of the safety of products concerning the environment and health, the institute of occupational hygiene and poisoning control, the institute of radiation protection and nuclear safety (also the center of nuclear emergency of the Ministry of Public Health), the institute of health education, the center of technical guidance for rural water supply improvement, and the national health center for women and children.

**So far none of the POPs has been monitored in the system of public health.**

The Ministry of Public Health carried out a dynamic study on the accumulation level of harmful matters in people’s bodies in 31 cities of 28 provinces and municipalities in the 1980s. Monitoring

and testing were carried out for DDT in waters, for DDT and PCB in bio-materials, which lasted to the end of the 1990s. Now China's Disease Prevention and Control Center. Can detect all the 12 sustainable organic pollutants. Provincial disease prevention and control centers are now able to detect DDT in water and DDT and PCB in bio-materials. Starting from 2000, the Ministry of Public Health began to further standardizing the toxicity of chemicals and the approval of the qualification of laboratories for toxicity appraisal. The standards of GLP laboratories shall be popularized in China so as to raise the quality and reliability of monitored data.

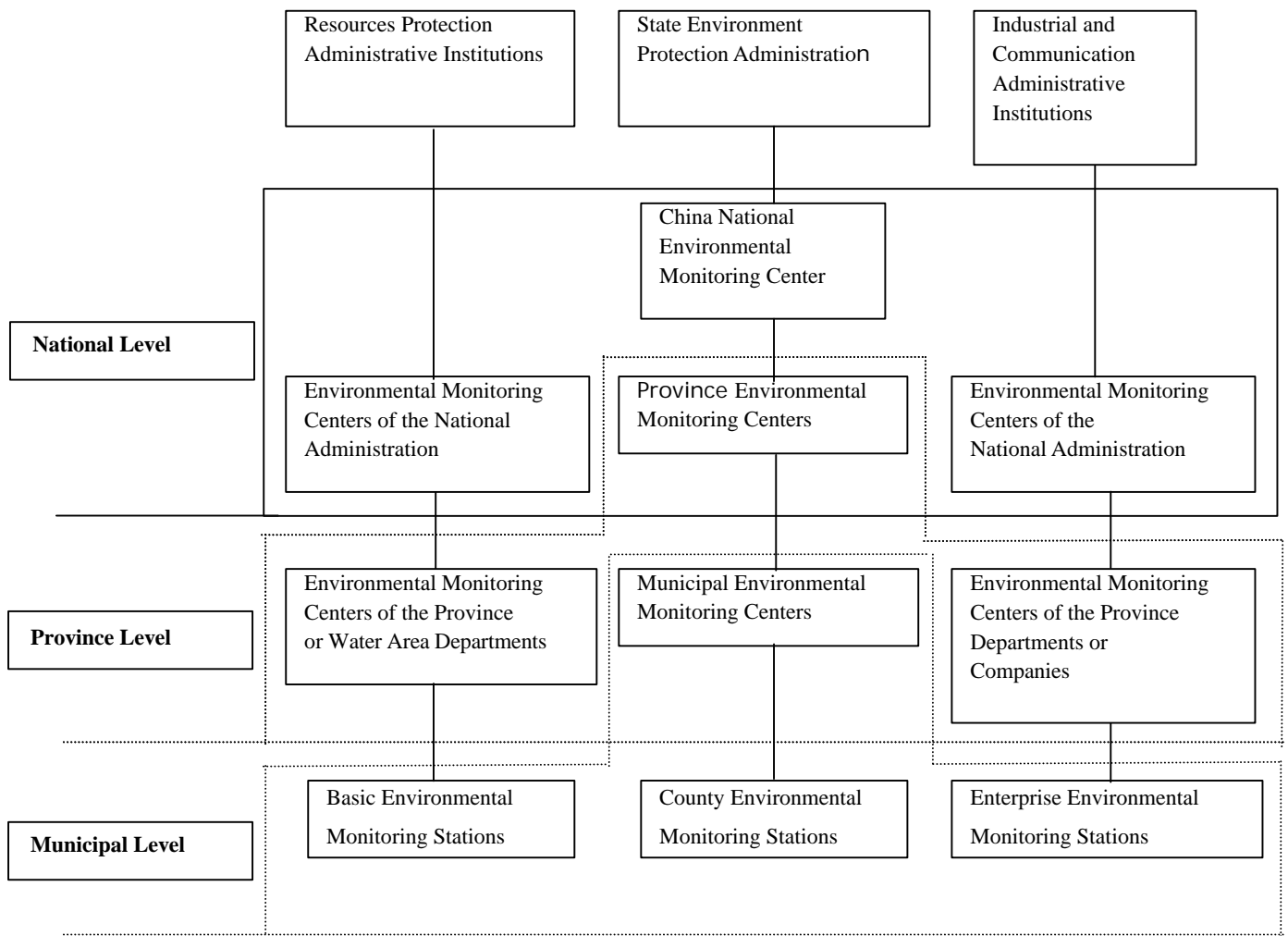
### **2.3. Relation between the system of environmental monitoring institutions and other system of monitoring institutions**

Up to 1992, there were as many as 4,000 monitoring stations with a total staff of nearly 70,000 throughout the nation as administrative departments of the State Council in charge of the environmental protection, natural resources, industry and transportation, and military environment, who carried out monitoring over the quality of the atmosphere, surface water, noise, seas, the ecological system, and radiation according to their division of work.

In 1992, together with other concerned departments the SEPA launched the plan to establish a national environment monitoring network formed of stations at three levels. At the national level, the network is formed by China's national environment monitoring center, the central environment monitoring centers of provinces/municipalities, monitoring centers of other ministries, departments and bureaus of the State Council, and the monitoring center of the army; at the provincial level, the network consists of environment monitoring stations of provincial cities and prefectures, and those of different departments of the provincial government; the network of the city level is formed by monitoring stations of their cities, prefectures, counties and concerned departments and enterprises.

Monitoring institutions of environmental administrations are under the direct leadership of the administration of the same levels and professionally are led by environment monitoring institutions of the upper levels. Special professional monitoring institutions are lead by concerned departments and cooperate with environmental protection administrations of the same level and their monitoring station. Under the unified leadership of environmental protection administrations, monitoring centers and stations carry out their work according to the principle of division of work.

Environmental protection administrations at the national, provincial, city and county levels are in charge of the organization and coordination of the network at their respective levels. The centers at different levels also serve as the center of the network, technology and data of the same level. See Fig. 2 for the structure of China's environment monitoring network of three levels.



**Fig.2. China's Environment Monitoring Network**

China's Departments in charge of public health took over the work of the China monitoring station of the GEMS from 1981 to 1992, and the work was given to environmental protection system after 1993. The five cities of Beijing, Shanghai, Guangzhou, Shenyang, and Xi'an are responsible for the monitoring of GEMS/ AIR, and Wuhan City, Jinan City, Guangdong Province, and Wuxi City are respectively responsible for the monitoring of the water quality of the Yangtze River, the Yellow River, the Zhujinag River and the Taihu Lake.

#### **2.4. The system of laboratories for PCDD/Fs analysis**

##### **2.4.1. Shenzhen Disease Prevention and Control Center**

The Shenzhen Disease Prevention and Control Center was established on the basis of the sanitation and anti-epidemic station of Shenzhen City. It now has 24 offices with a total staff of 248. It boasts equipment and instrument worth 50 million yuan and buildings of a total area of 9,100m<sup>2</sup>. It was the first laboratory approved in China's system of public health in January 2000 (according to principle 25 of the ISO/IEC). It was appraised and approved by the ISO9002 quality administration system in January the following year.

Besides normal physical and chemical tests of foods, water, air, and bio-materials, the Shenzhen Disease Prevention and Control Center has also carried out other work, such as the testing and popularization of new methods and new materials. It has accomplished many provincial, ministerial, and city key scientific research programs entrusted to it.

Professionally the center is led by China's National Disease Prevention and Control Center.

In 2001, the government invested 7.5 million yuan to set up a PCDD/Fs analysis laboratory in the Shenzhen Disease Prevention and Control Center and equipped it with HRGC/HRMS, and the accessory system for condensing and purifying samples (the first one in China especially for the testing of PCDD/Fs and is of high efficiency) as well as the series of PCDD/Fs, providing essential material basis for PCDD/Fs analysis.

The laboratory now has a personnel echelon formed basically of those with degrees of doctorate, mastership, and bachelorship, who have mastered solid theoretic basis and experiment operation techniques and have undergone special training for PCDD/Fs analysis.

The laboratory has compiled detailed SOP from pre-treatment of samples, instrumental analysis, to data process in light of EPA1613, and the accuracy of its analysis can reach the level of fg/g ( $10^{-15}$ g/g, ppt).

The laboratory conducted analysis of CRM534 samples sent by the BCR Company, and the results tally with theoretically expected values, the errors in the three tests turned out to be <10%, and the rate of recovery reached 80%~120%.

The laboratory has tested about 20 real samples including milk powder, plant oil, and animal fat, and analyzed the PCDD/Fs contained in their stroma.

In June 2002, the laboratory has received approval of the CNAACL (GB/T 15481-2000, idt ISO/IEC 17025: 1999). In November 2002 it was approved by the GLP of the Ministry of Public Health. Analysis reports by the laboratory are now accepted by concerned departments of most countries, including laboratories in 36 countries and regions like the USA, the UK, and Japan according to the ILAC-MRA.

The laboratory has established fine cooperation with many laboratories engaged in PCDD/Fs analysis. It has reached an agreement of long-term cooperation with the dangerous matters laboratory of the environmental protection of California, the USA, which includes personnel and technical exchanges. It has also has an agreement to carry out mutual testing for samples positive for PCDD/Fs. Professor ???, internationally well-known expert in PCDD/Fs analysis of Tokyo University of Agriculture has been invited as the advisor of the laboratory.

The laboratory is now carrying out the research on three projects, which mainly concern the amount of PCDD/Fs exposure in human bodies through food by analyzing the background value of PCDD/Fs.

#### **2.4.2. PCDD/Fs analysis laboratory in Beijing University**

The construction of the PCDD/Fs analysis laboratory in Beijing University cost an investment of 6.15 million yuan. With a total area of 150m<sup>2</sup>, it is now a key laboratory of the Ministry of Education.

The infrastructure of the laboratory was completed in May 2001. The installation and test of all its instruments were done in November of the same year. The design of the laboratory had taken into consideration of all the requirements for advanced laboratories, such as those for operational safety, fire prevention, environmental pollution control, quality control and insurance, even stricter than the international standards required for PCDD/Fs laboratories. For example, the air filter system can change the indoor air 35 times per hour (the international standard being 25 times/h), the air dispelling capacity of its automatic ventilator reaches 5m/s. The solvents containing chlorine must be exposed to ultra-violet light for 24 hours before they can be discharged, and waste water from the laboratory must first be filtered through active carbon.

The laboratory is now determining and compiling documents on the standard procedures of the environment and PCDD/Fs analysis, researching on the methods of development, sampling, pre-treatment, and instrumental analysis by making reference to standards used in Japan. It is also developing and testing new methods of its own. It has compared its established methods with those of a laboratory in Japan and the result proved good.

The laboratory now has a staff of 9, who are all technical personnel. At its full capacity, the laboratory can receive 15 people to carry research at the same time.

Starting from 2000, the laboratory has carried out cooperation with the SEPA on the research of the analysis of the PCDD/Fs in the smoke and flying dust produced in the burning of solid waste matters. Funded by the Beijing municipal government and the state fund for natural sciences the laboratory is now carrying out research projects of “prevention and treatment of environmental hormone pollution” and the “study on the PCDD/Fs in soils in Beijing”. It started the demonstrative project of the “assessment of PCDD/Fs levels in human bodies” sponsored by the state fund of natural sciences.

#### **2.4.3. Eco-environment research center of the Chinese Academy of Sciences**

The eco-environment research center of the Chinese Academy of Sciences was founded in 1975 on the basis of the former environmental chemistry institute of the Chinese Academy of Sciences. It is one of the institutions carrying out researches on POPs in China. Many of its research results provided scientific basis for the nation’s decision making in relevant fields. (see the “Initial Report on the Assessment of China’s Implementation of the *Stockholm Convention*”.)

The center now has a staff of 374, one third of whom have senior professional titles. It has 6 laboratories and 3 divisions and a center for industrialization of high-tech. Many of its research groups are carrying out researches on POPs.

Supported by the Chinese Academy of Sciences and the state fund of natural sciences the center has carried out research on the “changes of chemical pollutants in the environment and their ecological impact” which includes the researches on the methods of POPs like PCB, PCDD/Fs and the mechanism of their degradation. The center has also compiled the Controlling Standards of the Burning of Urban Consumer wastes, which sets the limitation of the content of PCDD/Fs in the smoke discharged from chimneys of burning furnaces. The center is currently carrying out research of the 863 Plan set by the state and major projects of the Chinese Academy of Sciences on the controlling methods of sustainable organic pollutants and the techniques in their sampling and analysis.

In its initial stage, the center was mainly engaged in the quantitative and qualitative analysis on the PCDD/Fs in environmental samples of some industrial products, flying dust, soil, base soil, and water by using HRGC/LRMS.

The center has now set up a laboratory on the analysis of PCDD/Fs, which is equipped with HRGC/HRMS. The laboratory boasts first rate equipment in China with purifying room reaching the grades of the thousand and ten thousand.

That laboratory was founded on the basis of over a dozen years’ researches on PCDD/Fs, so its comprehensive research capacity is of the first rate in China. But, as it was established not long ago, the quality of ultra-trace analysis is not perfect, and no comparison has not been carried out with foreign laboratories.

#### **2.4.4. PDCC analysis laboratory of the aquatic institute in Wuhan**

This laboratory was established jointly by the aquatic institute of Chinese Academy of Sciences and the institute of eco-chemistry of the GSF of Germany in September 1996, the first one for PCDD/Fs analysis in China equipped with.



The laboratory has an area of 340 m<sup>2</sup> with a staff of 9.

The laboratory has compiled its own standard operation procedures and received its approval from the state quality test bureau and the Ministry of Public Health for a valid period of five years respectively in November 2000, and March 2001.

The laboratory's research projects concerning the study of PCDD/Fs include environmental behavior of poisonous organisms and their toxicological studies. It is currently carrying out study project on the sources and converge of PCDD/Fs in the Yaerhu region. It is also engaged in the assessment of the ecological impact and toxicity of water pollution of PCDD/Fs and its biological treatment, the methods to screen enzyme immunity of PCDD/Fs pollutants.

However, in the last year, there was something wrong with the laboratory's HRGC/HRMS and its personnel were being changed, which affected its normal operation.

#### **2.4.5. The institute of nutrition and food safety (INFS) of China's Disease Prevention and Control Center**

The INFS is a institution specialized for nutrition and food safety. It is also the national center for technical guidance on nutrition and food safety.

The INFS is devoted to the following tasks:

- (a). To provide scientific evidence and technical support for formulating relevant laws, policies, technical standards and regulations on nutrition and food safety. To research to develop preventive strategies.
- (b) To conduct comprehensive analysis on nutritional factors undermining people's health and put forward assessment reports.
- (c) To establish and perfect the surveillance system for food-borne diseases, food pollutants and diseases related to unsafe food. To give forewarnings for food poisoning and diseases caused by unsafe food. To provide technical support to emergency responses for accidents caused by unsafe food.
- (d) To establish and perfect the surveillance system for the nutritional and health status of the Chinese population. To conduct supervisory and preventive work on diseases related to malnutrition.
- (e) To organize work out health standards for nutrition and food hygiene and relevant testing methods and technical norms.
- (f) To establish and perfect technologies for food safety control and their popularization.
- (g) To provide testing and categorization and assessment and technical arbitration for the nutrition, safety, and functions of various foods including common food, health food, new foods and genetically modified food, special dietary food as well as additives, packing materials, containers, manufacturing instruments, disinfectants for foods and other related products. To provide certificate service for the government and society.
- (h) To establish and perfect the quality laboratory quality control system for nutrition and food safety, and to be responsible for quality control at the national level.
- (i) To provide professional instruction and guidance and special personnel training.
- (j) To establish the national food and nutrition information system and strengthen and promote

information exchange and resource sharing.

(k) To develop application research in the field of food and nutrition sciences.

(l) To carry out international cooperation and exchange in the field of nutrition and food safety.  
And

(m) To complete other tasks and obligations as assigned.

Entrusted by the Ministry of Public Health, the institute is now setting up an PCDD/Fs analysis laboratory that meets the international standard of the GLP so as to carry out the study on the series of safety standards—including those of POPs of foods in China.

#### **2.4.6. China Environment Analysis and Test Center**

As one of the 13 national analysis and testing centers professionally led by the Ministry of Science and Technology, China Environment Analysis and Test Center is a public institution under SEPA. It was established in 1984 and became an open the central laboratory of the Sino-Japan Friendly Environment Protection Center.

The center has very good hardware conditions such as fine houses and advanced equipment, with 1444 sets of analysis instruments, including GC-MS, GC-FTIR, ICP-AES, XRF, Electron microscope, Element Analyser of C, H and N, AAS, UV, GC, LC etc..

The center now has a working staff of 22 technical persons, of whom 7 have got doctorate and 7 mastership. A number of them have undergone special training for PCDD/Fs analysis in Japan.

The center is now fully capable of PCDD/Fs sampling and pre-treatment. It is now carrying out cooperation with the PCDD/Fs analysis laboratory of Beijing University, which is responsible for analysis by HRGC/HRMS while the center's task is sampling and pre-treatment.

The center's major projects concerning POPs analysis include the laws of PCDD/Fs discharge of in the burning of consumer waste matters and their countermeasures (a project assigned by the SEPA), methods for the analysis of non-degradable organic pollutant PCBs (a special project assigned by the Ministry of Science and Technology) and the monitoring and analysis of the environment in Southeast Asia (a project assigned by the United Nations University).

#### **2.4.7. Zhejiang provincial central environment monitoring station**

Founded in 1980, the Zhejiang provincial central environment monitoring station is a station of the second level in China's national environment monitoring network, under which are six sections: the general office, comprehensive administration, central analysis laboratory, departments, water monitoring section, atmosphere monitoring section and quality testing section.

The station is located in the high-tech development zone to the northwest of Hangzhou City, with a total constructed area of 5,000m<sup>2</sup>. Its equipment for organic analysis includes a LC, two GCs, and a GC-MS?

The station has a staff of 55, of whom 69.19% are senior technical personnel. Its central analysis laboratory has all large analysis instrument need for analyzing organic pollutants. Its 5 staff are all under forty, and four of them have been undergone special organic matter investigation and analysis in Japan, the United States, or Germany.

The station began to carry out monitoring DDT and BHC in grains, sea water, substrate, and organic bio-samples. It accomplished the study of the GC to analyze the PCBs in water and sea water in 1993-95. In 2001 the station took part in the China-South Korean joint project of

detecting the content of in the sediment samples from the Yellow Sea (by using the GC/MS method).

In 1999 Zhejiang province launched a cooperation project with the German government on the study of solid waste matters. The Zhejiang provincial central environment monitoring station conducted a series of cooperative study and research with the German party. 1999, when some German experts came to the station to give guidance in the PCDD/Fs monitoring, and the station carried out monitoring over possible PCDD/Fs sources (power station burning refuse, waste gas and flying dust discharged from iron and steel factories, waste water treating factories, pesticide manufacturers, and sludge from canals).

Three of the staff members have received training by German experts and then went to the MPU laboratory in Germany for further training on PCDD/Fs analysis.

As the station uses existing HRGC/LRMS in PCDD/Fs sample analysis, the results were all a little higher than the values of the results analyzed by using HRGC/HRMS.

The current work of the station concerning POPs includes: the study on the feasibility of monitoring the content of PCDD/Fs in the solid waste matters and waste gas discharged from the incinerators by using HRGC/LRMS, the current situation of typical organic toxic pollution in drinking water and countermeasures to be taken.

### **3. Obstacles and problems China's monitoring and analysis institutions are facing in the implementation of the Stockholm Convention**

#### **3.1. Not enough fund**

Fund of institutions engaged in monitoring and analysis usually come from the following channels: allocation from national or local financial administrations, national or local science and technology administrations, the state fund for natural sciences, international cooperation projects, superior departments, and income by offering social service.

Monitoring and analysis over POPs is a systematic project requiring large amount of fund, but the Chinese government cannot afford all the fund needed as its financial capacity is limited. As for social services, the capacity of monitoring and analysis institutions is far from expectation of society and the market of social service has by no means fully established. All this results in the serious shortage of fund for institutions of POPs monitoring and analysis.

#### **3.2. Backward technology and methods**

Methods used in China for the monitoring over organic chemicals are still quite backward. None of the 12 POPs has been listed in the parameters to be monitored. There is so far only national standards for monitoring DDT in water, soil and organisms (GB7492-87, GB/T14550-93, GB/T14551-93), but no standards at all for other POPs.

Technique for sampling and pretreatment: Because the environmental monitoring over POPs mostly use trace and ultra-trace analysis, especially for PCB, PCDD/Fs. As the environmental background is complicated and its samples vary greatly with so many parameters to be analyzed. Current techniques in China's environment monitoring can hardly meet the high demands for the sampling and analysis of POPs.

#### **PCB and PCDD/Fs analysis and testing**

Only a few institutions and universities in China have begun PCB and PCDD/Fs analysis, and mostly using the method of GC/ECD for the total amount. Very few are able to use USEPA1668 HRGC/HRMS and so China lacks such experience.

Quick methods for monitoring and testing: China lags still far behind in the quick method of POPs detecting, actually is blank in this respect.

### **3.3. Administration**

Data from POPs monitoring and analysis institutions are mainly used for environmental quality appraisal, environmental administration, and environmental scientific research and thus they must be scientific, accurate, fair, and authentic. So institutions of POPs monitoring and analysis should undergo get metrological examination and qualification approval according to relevant regulations.<sup>i</sup>

To ensure international comparability of monitored and analyzed data, institutions of POPs monitoring and analysis should try their best to work out standard operation regulations to ensure the quality according to the norms for GLP laboratories, and carry out comparison with their foreign counterparts.

At present the approval of environment monitoring institutions are following the stipulations of Content and Requirements for the Examination and Approval of Environment Monitoring Institutions formulated by the SEPA in 1992 based on Metrological Approval and Examination Requirements for Institutions of Quality Testing (JJG1021-90).

Concerned laboratories are executing the *General Requirements for Laboratories of Testing and Calibration*(GB/T 15481-2000, idt ISO/IEC 17025: 1999) issued by the former national Bureau of Technical Monitoring.

Though many environment monitoring institutions, especially those above the provincial level, have passed such metrological approval and are qualified to provide notarial data, many local stations have not obtained such qualification.

Much has been done by the environment monitoring system to ensure quality. But owing to the limit of their technology and fund and institutional changes, the insurance of quality is far from systematic with standard procedures, especially in the stage of pretreatment. ensuring movement

As for the approval of laboratories, only about 10 laboratories in China have obtained approval, who have formulated quality insurance handbook and standard operation procedures according to the *General Requirements for Laboratories of Testing and Calibration*.

China is still building its laboratories of PCDD/Fs analysis. Except the two in Shenzhen and Beijing University, other PCDD/Fs laboratories are not yet carrying out the GLP norm, with on standard operation procedures or quality insurance handbooks.

As for international comparison, basically China's environment monitoring institutions have not carried it at all except very few laboratories.

Therefore, one of the major task most of China's POPs monitoring and analysis institutions are facing in the implementation of the Stockholm Convention is the construction of administration, that is to standardize the administration over all institutions of monitoring and analysis, enforce the *General Requirements for Laboratories of Testing and Calibration*, in key institutions, especially PCDD/Fs analysis laboratories. Their operation must follow the GLP, formulate quality insurance handbooks and standard procedures from sample receiving, storing , analysis to tracing, and carry out international comparison.

### **3.4. Hardware conditions**

Existing monitoring and analysis instruments are not complete, there is especially a lack of

equipment for sampling, pretreatment and the disposal of matters to be cast away after analysis.

Lack of fund for the maintenance resulted in the low efficiency of instruments and equipment usage.

As China's laboratories for PCDD/Fs analysis are in the initial stage, most of those which have been completed have only one HRGC/HRMS, while most of them have not got enough instruments or safety equipment. Some of them need remold for their infrastructure and the distribution of such laboratories has to be rationalized.

There is a great shortage of environmental standard materials. There are hardly any home produced standard samples except DDT. So it is very often to import expensive samples from other countries.

### **3.5. Technical personnel**

None of the 12 POPs has been listed in the parameters in the range for normal environment monitoring, and none of the monitoring networks in China has carried out monitoring over POPs. Though existing personnel and methods can meet the requirements for monitoring over DDT in water, soil, and organisms, the ban of the production and usage of DDC in 1983 in China, the monitoring over DDT (sometimes including HCB) remains meaningful only for certain scientific research projects.

There are so far neither techniques or methods nor study on the monitoring over most POPs, especially Heptachlor and Aldrin. There is simply zero practice so far in this field in China.

There is so far no long-term planning for the training of special personnel in this line, especially concerning quality insurance and self-protection.

### **3.6. Coordination**

China's national environment monitoring network was established as early as 1992. However, its actual operation is by no means well coordinated because of many reasons. The separation between different departments and regions is quite common and there is much overlapping as well as gaps in some fields. Impeded communication between different departments and regions seriously hindered the exchange and share of information concerning POPs.

Along with the transformation from the planned economy to the market economy, monitoring institutions of the transportation system and industrial system are drifting further away from those of the environment protection system.

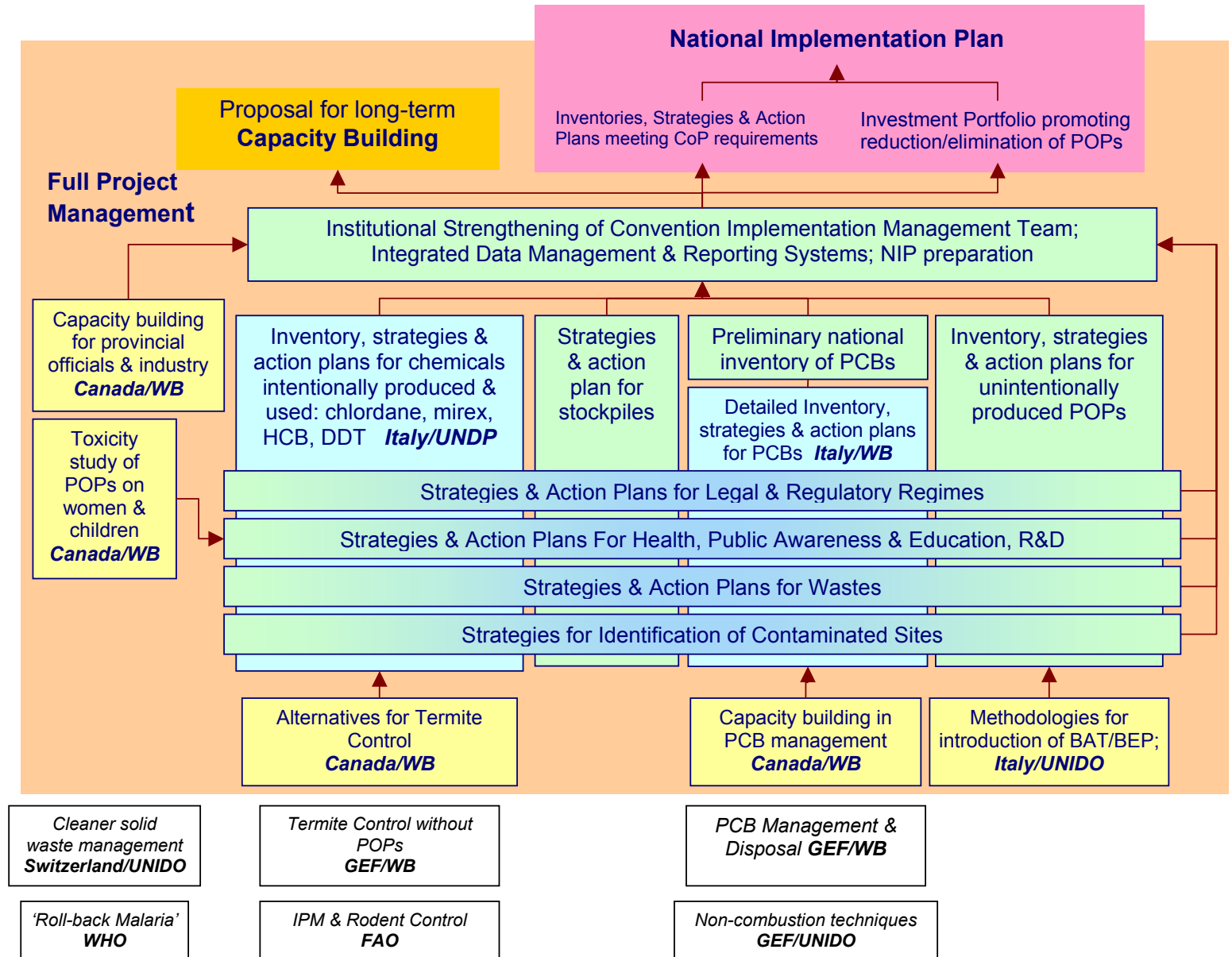
## **4. Priority Projects in the development of China's NIP**

See *Report on the Priority Projects in China for POPs Monitoring and Analysis*.

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## Appendix 7: Arrangement of Work Packages within the Full Project



**Appendix 8:**  
**A Toxicity Study of POPs on Women and Children**

## Terms of Reference

### A Toxicity Study of POPs on Women and Children

#### Background

1. DDT and PCBs belong to the family of chlorinated aromatic hydrocarbons. DDT was produced and applied widely as an insecticide for three decades (1950s to the 1970s) in China because it offered cheap and effective pest control. The production and application of DDT, however, have declined gradually since the late 70s. PCBs were mainly used in electrical equipment such as transformers. In accordance with the restrictions on the production and import of equipment containing PCBs, most PCB-containing transformers were sealed up and buried. The Government mandated deep burial of transformers that had first been encased in cement to avoid leakage. However, few transformers were buried. Moreover, some transformers leaked PCBs due to corrosion and this corrosion is expected to accelerate as global temperatures climb due to climate change. PCBs have polluted the environment in China and have entered food chains, threatening the well-being of plants, animals and human being.

2. DDT and PCBs have been declared Persistent Organic Pollutants (POPs) under the Stockholm Convention. These chemicals have the potential to endanger human health of the present as well as future generations because of their toxicity, accumulation and bio-magnification in the food chain and long term stability in the environment. They can cause cancer, birth deformities, immune and reproductive system damage, affect learning, attention span and intelligence, and they can disrupt the endocrine system. The potential health risks are greatest for women and children because of the influence of these and other POPs on reproduction and because of the sensitivity of the fetus and young children to the effects of POPs during early development. DDT and PCBs pass from mothers to unborn babies via the placenta leading to potentially serious damage such as birth defects and impaired fetal development, especially of the developing nervous system. These contaminants also are passed from mothers to their newborn babies through breast milk.

3. The United Nations Environment Program's awareness campaign on POPs led to the adoption of Stockholm Convention – a global framework to control the production and use of 12 chemicals called the "dirty dozen." Supported by 151 signatories, its aim is to "... protect human health and the environment..." through the elimination or restriction of production and use of POPs. In China, the State Environmental Protection Administration, Ministry of Health and Ministry of Agriculture as well as other relevant ministries relating to the POPs issue supported this agreement enthusiastically.



**Context**

4. In spite of having carry out several large scale national environment investigations about POPs, however, the investigations were mostly focused on the pollution of DDT on soil, rivers, lakes mud and some water bodies around the coastal waters and obtained some information about the toxicity of POPs. Until now, there is still no monitoring data of POPs concerning their contents in human bodies and in other biological organisms; There is a shortage of data and basic information about the extent of pollution and the impact of POPs on human and environmental health. For control and elimination of POPs that threaten the environment and human health in China and in the whole world, and providing information for policy-maker to implement the POPs convention actively, it is necessary to evaluating the health effect and degree of the effect of POPs.

5. According to China's situation and limited analysis capacity, the evaluation will be mainly focus on the DDT and PCB which had been largely produced and consumed in China.

**Objectives**

6. The objective of this Pilot study is to investigate the exposure of POPs and their adverse effects with special emphasis on the health of women and children. The result will lead to further interest in the study of pollution especially that of POPs, engage China as an active participant in international agreement on POPs, and enabling her to provide assistance to other developing countries in promoting awareness with externalities of indiscriminate chemical use and benefit of compliance with this and other environmental protocols.

An additional benefit will be the development of a rich database on the state of pollutions, its impacts on health and results of clinical research targeting POPs. This can become the basis for future studies.

**Proposed Project Activities**

7. Proposed activities included:

- a. Collect available information/reports regarding the adverse health effects of these pollutants – domestic and foreign studies on toxicity, epidemiology, etc.
- b. Hold an experts workshop to review the information collected and select the study sites (city or county). (i.e. Jiangsu, along the Yangtze River, where industries and population are concentrated, and Yunnan rural areas where DDT is still being applied. PCB transformer burial sites); design questionnaires, select sampling and analysis technique, determine all technique requirements for this study ,establish the sampling cohort ,develop the work plan for the study.
- c. Training the field team about the methods for field investigations, health examination, clinical examination, monitoring and analysis of samples.
- d. Collect information on the level of DDT and PCB in the environment-water, soil and food in the pilot area (if related information are not available, the samples analysis is necessary.).

- e. Sampling and clinical examination on subjects (women and children) from the population in the investigated areas:
- f. Analysis the blood sampling to identify the level of POPs in the subjects.
- g. Preliminary assessment of health impact posed by existing pollutants to guide future actions.

### **Proposed Implementation plan**

8. The project is expected to be completed within two & half years after the Letter of Agreement between China and the Bank has been signed and becomes effective. Proposed implementation schedule is detailed in Annex 1. However, implementation schedule could be adjusted based on actual project progress.

### **Project Deliverables**

9. Based on project objectives and activities, deliverables are expected to be:
- a. General status report on the adverse health effect of POPs (DDT and PCB).
  - b. Report of clinical examination and blood analysis, with information on the extent of exposure to POPs by people, especially women and children and the associated adverse health effects due to such exposures.
  - c. A preliminary assessment of health impact posed by existing pollutants to guide future actions.

### **Management and Implementation Arrangements**

10. The World Bank has been invited as the international implementing agency for this project. The project will be implemented under the framework of a Letter of Agreement between the Government of Canada and the World Bank. The project will be managed by the Department of Environment and Social Development in the East Asia and Pacific Region in the headquarters of the World Bank in Washington D.C, and the Bank will also be represented by its Beijing office in China. The China State Environmental Protection Administration (SEPA) is the Government co-coordinator for the POPs Convention, and as such, will designate its Foreign Economic Cooperation Office (FECO) to be the lead national implementing /executing agency for certain activities of this project and will be responsible for all project activities.

11. Other key players in the project include the Ministry of Health and related departments on POPs. It is therefore necessary that the lead national agency (SEPA) consult and collaborate fully and closely with all other ministries and organizations with the view to consolidating project findings into the NIP.

12. The World Bank will be responsible for monitoring and evaluating project objectives, outputs and activities, and emerging issues. The Bank will manage the Trust Fund based on the

Banks' established procedures.

### Reporting requirements

13. FECO will provide the Bank with a semi-annual progress report on project implementation status. If necessary, the progress report will provide justification for any changes in proposed activities. When the project becomes effective, the Technical Advisor/FECO and the Bank will agree on a reporting format.

### Budget

14. The total project budget is US\$200,000, comprised of US\$180,000 Canadian Trust Fund, of which \$30,000 is for Canadian consultants, and \$20,000 in-kind contribution by China in terms of personnel, office and facilities, etc.

<b>Budget Item supported by the World Bank</b>	<b>Total in US \$</b>
Consultants for information collection and site selection	7,000
International consultant(s) on technical advice	30,000
Clinical examination and sampling	50,000
Blood sample analysis	35,000
Experts workshop	20,000
Training - Sampling and investigation	13,000
Reporting/Publications/Communication/Travel	25,000
<b>Total contribution from the Canadian Trust Fund</b>	<b>180,000</b>
Government contribution in-kind	20,000
<b>Total project cost</b>	<b>200,000</b>



**Annex 2- Proposed Implementation Plan and Budget for Toxicity Study**

No.	Activities	Description of Activities	Proposed date	Deliverables	Proposed Budget (in US dollar)
1	Collection of information	Collect available information/reports regarding the adverse health effects of these pollutants – domestic and foreign studies on toxicity, epidemiology, the documents and literature etc.	September 2002 to May 2003	General status report	2,000
2	Experts Workshop	Review of information collected, sites selection, design questionnaires, select sampling and analysis technique, determine all technique requirements for this study ,establish the sampling cohort ,develop the work plan for the study	September 2002 to April 2003	Workshop minute including work-plan for the study	33,000
3	Training for field team	Develop and validate all methods for field investigations, health examination, clinical examination, monitoring and analysis of samples;	May - June 2003	Workshop minute	
4	Information collection on pilot sites	Collect information on the level of DDT and PCB in the environment-water, soil and food in the pilot area (and testing may be conducted)	July 2003 – June 2004	Status report on pilot sites	5,000
5.	Recruitment of international consultants	Provide technical advice on clinical examination, sampling and blood analysis.	May 2003 to October 2004	Consultant(s) reports	30,000
6	Clinical examination and sampling	Cooperation with an medical institution with required expertise; physical examination; blood sampling; and health impact to the sampling bodies;	May 2003 to October 2004	Report on clinical examination	50,000
7	Sampling blood analysis	Analysis on level of POPs	August 2003 to August 2004	Blood technique analysis	35,000
8	Finalization of report	A preliminary assessment of health impact posed by existing pollutants to guide future actions.	By the end of March 2005	Preliminary assessment of health impact posed by existing pollutants to guide future actions.	25,000 (including communication, travel for FECO staffs, printing cost, material preparation, etc)
Subtotal for China from the Canadian Trust Fund					180,000
Governmental Contribution in-kind					20,000
<b>Total project cost</b>					<b>200,000</b>

**Appendix 9: PROJECT DOCUMENT**

**Strategy and Program on Reduction and Phase-out of Pesticidal POPs in  
China**

## Appendix 9: Strategy and Program on Reduction and Phase-Out of Pesticidal POPs in China

### PROJECT DOCUMENT

Project Number: CPR/01/R51/A/CC/31

Country: Peoples Republic of China

Project Title: Strategy and Program on Reduction and Phase-Out of Pesticidal POPs in China

Project Budget: EURO 1,940,400

Duration: 2 years. Estimated start date of July 2001

Brief Description:

The immediate objectives of this two-year project are to develop a strategy and programme for the reduction and phase-out of pesticidal POPs in China, and to strengthen the capacity and infrastructure within the State Environmental Protection Administration (SEPA) for formulation and coordination of national actions on POPs. The outputs of this project will contribute to the formulation of the National Implementation Plan with respect to pesticidal POPs.

Approved on behalf of:

Signature	Date	Name/Title
Government of Italy _____	_____	Dr. Corrado Clini Director General, Department for Global Environment, International and Regional Conventions. Italian Ministry for Environment
Government of China _____	_____	Mr. Liu Yi Director General, Foreign Economic Cooperation Office, Chinese Environmental Protection Administration

# **Strategy and Program on Reduction and Phase-out of Pesticidal POPs in China**

## **CPR/01/R51**

### **1. Background**

#### **Global Context**

Persistent organic pollutants (POPs) are half-volatilized organic substances which are relatively less soluble in water, but readily absorbed in fatty tissue and accumulated in organisms through the food chain so as to impact human health. These highly stable compounds can last for years or decades before breaking down. They circulate regionally and globally through the transportation of air and water. POPs released in one part of the world can, through a repeated (and often seasonal) process of evaporation, deposit, evaporation, deposit, be transported through the atmosphere to regions far away from the original source. Of all the pollutants released into the environment every year by human activity, POPs are among the most dangerous. They are highly toxic, causing an array of adverse effects, notably death, disease and birth defects, among humans and animals. Specific effects can include cancer, allergies and hypersensitivity, damage to the central and peripheral nervous systems, reproductive disorders, and disruption of the immune system. For the above reasons, POPs have become a major focus of concern within the international community.

In February 1997, the Governing Council of the United Nations Environment Programme (UNEP) initiated concerted international action to protect human health and the environment through measures that will reduce and/or eliminate the emissions and discharges of twelve persistent organic pollutants. The resulting creation of the Intergovernmental Negotiating Committee on POPs led to several negotiation sessions with the fifth and final session convening in Johannesburg in December 2000, where participants finalized the text of a legally binding treaty that will require governments to minimize and eliminate production and use of various POPs. In May 2001, the Stockholm Convention on Persistent Organic Pollutants was ratified with the signature of ninety countries.

The twelve initial POPs included in the treaty include eight pesticides (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, and toxaphene), two industrial chemicals (PCBs and hexachlorobenzene), and two unwanted by-products of combustion and industrial processes (dioxins and furans). The twelve chemical compounds included in the POPs treaty are mainly used as pesticides and disinfectants in agriculture and daily life.

Various UN organisations have worked with developing countries and countries with economies in transition, towards identifying and implementing programmes for management



and reduction of persistent toxic chemicals, including POPs. As priorities among substances within each country can only be defined in the context of specific conditions, taking into account factors such as climate, geography, level of economic development and other socio-economic circumstances, there is a need to develop comprehensive approaches towards the management and reduction of POPs for application at the national level.

### Country Situation and Strategy

Based on existing information in China, it is difficult to estimate the total current amount of POPs production, consumption and its pollution, not to mention its potential impact on environment and human health. However, as a country with mass production and huge consumption of chemicals, it is clear that POPs poses a severe threat to the environment and health of China.

According to a recent report of November 2000 by UNIDO's Regional Network on Pesticides for Asia and the Pacific (RENAP), China manufactures 440 types of pesticide active ingredients in about 1000 factories spread throughout the country with a total output of 424,000 tons. Out of this, insecticides (176) constituted approximately 70% of the total production, followed by herbicides 15% (121), fungicides 11% (93), and others, 4%.

Among the 10 POPs, China has produced DDT, toxaphene, hexachlorobenzene, chlordane, heptachlor and PCBs. Among these, DDT, the leading agricultural chemical, has been produced the most, followed by toxaphene. Small-scale production of hexachlorobenzene, chlordane and heptachlor is still undertaken for PCP and PCP sodium production and mirex and underground insect pest elimination. To date there still remains small-scale production and consumption of DDT, chlordane and mirex, among which DDT is used as agent in the production of tetradiphon, chlordane for antisepsis for construction of foundation sites. Mirex is used for termite elimination. Some electric appliances containing PCBs are still in use in China.

With respect to dioxins and furans, two types of unintentionally produced POPs, environmental monitoring of these by-products has not been conducted; therefore, the extent to which they have polluted the environment and threatened health is not clear. In China, garbage burning is not a primary method for waste treatment, but chloric alkali production and discharge of exhaust gas and waste residue from iron and steel industry will release certain dioxins and furans. PCP sodium, the main medicine for preventing and controlling the schistosome also contains a certain percentage of impurity of dioxins and furans.

Due to the current economic and technical level in China, many electric appliances and equipment containing PCBs are still in service. During the 1970's-80's, efforts were made to collect used and waste transformers and electric appliances and equipment containing PCBs, for disposal. Because so much time has elapsed, records have been lost, and individuals who were responsible for this initiative have retired or passed away, the used and waste electric appliances and equipment that were collected for disposal can no longer be found. According to the existing records in some depositaries, most of these appliances have rotted away and the transformers' oil has leaked out, which has created new pollution to the surrounding environment.

The Chinese government has historically given considerable attention to the influence of

organic pesticides containing Chlorine, on human health and the environment, and has formulated a series of policies and regulations on reducing production and consumption of several organic pesticides containing Chlorine. However, it is clear that many of the other compounds included in the POPs Convention are still being produced and consumed, or are being generated unintentionally as by-products of various industrial processes, eg. DDT, chlordane, mirex, etc. Because an economically and technically feasible alternative has not been identified, chlordane is still used in China for sterilization in construction sites. Research on alternatives to POPs has become the first challenge in the development of a strategy towards POPs restriction and phaseout.

Although China has conducted many large-scale environment surveys at the national level, data to determine the impacts that POPs may have on ecological environment are still insufficient. For example, DDT has been used for quite a long time and can still be found in farm soil, water bodies of rivers and lakes, and riverbed sediment.

Currently there are no official rules or regulations pertaining to POPs. The Rules on Preventing Electrical Devices Containing Polychlorinated Biphenyles and Their Wastes from Polluting the Environment jointly issued by SEPA and the Ministry of Energy on January 23, 1991 is the only initiative addressing environmental pollution by POPs. These Rules apply to power capacitors, transformers and other devices using polychlorinated biphenyles as host materials and the resulting wastes containing polychlorinated biphenyles. The treatment and disposal of the obsolete POPs and substances containing POPs should be carried out in compliance with the relevant rules under Law of Prevention and Control of Environmental Pollution Caused by Solid Wastes. In 2000, China issued the Standards for the Pollution Control of Landfill Burning, setting the rules for the dioxins discharge in furnace or destructor.

The Chinese government has been attaching great importance to issues related to POPs. The Government has sent delegations to participate in all five POPs negotiations and two CEGs with respect to the standardization of documents of the Stockholm Convention on International Actions for Certain Persistent Organic Pollutants. The Government has made great efforts in the finalization of the convention in an active and constructive manner.

All of the above-referenced initiatives have demonstrated that China is addressing the situation in terms of POPs pollution, particularly with respect of PCBs and dioxins. However, it is clear that a great deal of research on the production, use and pollution status of POPs, along with an analysis of alternative technology, must be investigated prior to the development of a control, reduction and phase-out strategy.

During recent years, the international community has become increasingly aware of the environmental problems resulting from POPs. In reality, the problems caused by POPs in developing countries are much more serious than those in developed countries due to different levels of social and economic development. Subsequently, developing countries would have many more difficulties in implementing and realizing the objectives of the Convention. Therefore, developing countries and developed countries are not at the same starting point in terms of tasks and capacity. Developing countries need financial support and technical assistance in order to effectively implement the Convention

The POPs Convention requires countries to prepare National Implementation Plans (NIPs), within two years from its entry into force, that establish priorities for initiating future activities

to protect human health and the environment from POPs. The NIP provides a framework for a country to develop and implement, in a systematic and participatory way, priority policy and regulatory reform, capacity building, and investment programmes.

This two-year project will provide the framework under which the comprehensive investigation and research of the current situation of pesticidal POPs in China, and analysis of alternative technologies, can contribute to the formulation of a strategy for the reduction and phase-out of pesticidal POPs in China, one of the sector strategies in the NIP.

### Prior and Ongoing Assistance

This Sino-Italian pesticidal POPs project is one of several POPs initiatives in China. For example, UNDP currently funds a UNIDO-executed policy research initiative focusing on agricultural chemicals in China, and SEPA plans to work with UNIDO on an initiative that will focus on industrial chemicals (PCBs and HCB) and unintentional by-products (dioxin and furan). In addition, the World Bank and SEPA are embarking on an initiative for enabling activities on methodology for inventories and investigations. Therefore, it is critical to ensure complementarity among such parallel initiatives whose results will together contribute to the development of the comprehensive NIP as required by the POPs Convention.

## **2. Project Description**

The overall objective of this project is the development of China's capacity and approach towards the reduction and phase-out of pesticidal POPs in a manner that is consistent with its national priorities with respect to sustainable development and implementation of the POPs convention.

### **Immediate Objective 1: To develop a strategy and programme for the reduction and phase-out of pesticidal POPs.**

**Output 1: Preliminary sources/emission inventories of pesticidal POPs, focusing on production, distribution, use, import and export of pesticidal POPs in China.**

The investigation of the situation on pesticidal POPs production, distribution, use, import and export is a crucial element towards the development of an overall strategy. SEPA and relevant departments such as General Administration of Customs, State Economic and Trade Commission, Ministry of Agriculture, and industry associations will be involved in the investigation.

**Activity 1: Undertake a comprehensive inventory investigation on the production of pesticidal POPs with view to the following:**

- i) Develop a preliminary understanding of the current situation of enterprises producing pesticides and their possible distribution, through questionnaires, fields visit in the regions and sector, investigation in relevant departments and industry associations.
- ii) Develop and train on investigation methodology of pesticidal POPs production inventory.

- iii) Engage experts working groups to undertake comprehensive investigations.
- iv) Undertake carpet and auditing investigations in the enterprises that are potentially producing pesticides. To identify the quantity of the enterprises, production scale, current outputs, output in the past years, quantity of storage and the relative technical situation of the enterprises. It is foreseen that approximately 40-60 plants may be investigated.
- v) Further analyze and review the preliminary production inventory of each pesticide in China.
- vi) Formulate a preliminary inventory of pesticidal POPs in the production sector.

Activity 2: Undertake a comprehensive inventory investigation on the distribution and use of pesticidal POPs. This will be achieved through the investigation of consumers and/or intermediaries, with view the following:

- i) Identify distribution and use field of each pesticide listed in the POPs Convention, predict the distribution and use situation in the consumption field in the past years.
- ii) Select and train on investigation methodology of pesticidal POPs distribution and use inventory.
- iii) Engage experts working groups to undertake comprehensive investigations.
- iv) According to the recognized distribution and use field, investigate and identify the distribution and use of POPs, including the distribution/use amount, storage and distribution/use channels so as to estimate the national distribution and use quantities (estimated amount of lower reaches investigation).
- v) Further analyze and review the distribution and use amount of each pesticide in China.
- vi) Formulate a preliminary inventory of pesticidal POPs in the distribution and use sector.

Activity 3: Undertake a comprehensive inventory investigation on the import and export of pesticidal POPs

- i) Investigate the import and export situation on pesticidal POPs including the amount and channels of import and export.
- ii) Select and train on investigation methodology of pesticidal POPs import and export inventory.
- iii) Engage experts working groups to undertake comprehensive investigations.
- iv) Further analyze and review the import and export amount of each pesticide in China.
- v) Formulate a preliminary inventory of import and export of pesticidal POPs.

Activity 4: Undertake a comprehensive inventory investigation of obsolete pesticides

- i) Identify the potential obsolete pesticides during the course of production, distribution and use
- ii) Select and train on investigation methodology of obsolete pesticidal POPs
- iii) Engage experts working groups to undertake comprehensive investigation
- iv) Further analyze and review the obsolete pesticide amount in China
- v) Formulate a preliminary inventory of obsolete pesticidal POPs

**Output 2:        Assessment of potential pesticidal POPs reduction and phase-out technologies/products, and management and institutional context for management of pesticidal POPs.**

**Activity 1:        Undertake preliminary investigation of technology for pesticidal POPs reduction and phase-out**

- i) Investigate alternative technology of pesticidal POPs in China and other countries through data and information collection, field visits and workshops.
- ii) Assess the advantages and disadvantages, social and economic implications of various alternative technologies/products.
- iii) Review assessment reports on alternative technologies/products
- iv) Establish a group of experts (long-term) from industry sectors to advise on feasibility of alternative technology

**Activity 2:        Assess the national management system and institutions related to pesticidal POPs, including regulatory control; needs and option for strengthening them.**

- i) Analyze need for POPs reduction in relation to management system (including legal, regulation and policy) in China with respect to potential for implementing POPs Convention. Identify difficulties and obstacles.
- ii) Identify institutions dealing with pesticidal POPs in China. The production and consumption of pesticidal POPs have been closely related to environment, health, chemical industry, agriculture, trade and many other sectors. Understand the current functions of China's managing departments, and the institutional framework under which pesticidal POPs reduction and phase-out would operate.
- iii) Assess level of public awareness and public participation towards reduction of pesticidal POPs in China. Formulate recommendations with respect to increasing public awareness of POPs in China.
- iv) Assess monitoring and R&D capacity.

**Output 3: Strategy on the reduction and phase-out of pesticidal POPs.**

On the basis of the above-mentioned research, formulate through consolidation of activity reports, workshops and other consultative and participatory methods, the Chinese strategy and programme on pesticidal POPs reduction and phase-out, comprising the following elements:

- (1) current situation of POPs production, use, import and export
- (2) priority of POPs reduction and phase-out
- (3) appropriate alternative technology
- (4) framework of policies, regulations and management systems under which pesticidal POPs programmes would be implemented

**Immediate Objective 2: To strengthen the capacity and infrastructure within the China State Environmental Protection Administration (SEPA) for formulation and coordination of national actions on POPs.**

**Output 1: Strengthen capacity of SEPA, particularly the capacity of the national POPS Working Group (Annex III) within SEPA.**

As the administrative authority on POPs issues, SEPA has placed POPs work on the top of the work schedule for 2001, and in this regard, established a POPs working group earlier this year. The main functions of the POPs working group are as follows:

1. As the focal point on POPs issues, coordinate with relevant ministerial officials and experts from various sectors with view to preparation of POPs activities and the implementation of the POPs Convention.
2. Organize the experts groups for national actions on POPs issues.
3. Be responsible for project cooperation with foreign governments and multilateral organizations, acting as the national implementing organization in charge of the project organization, implementation, management and the corresponding logistics services.

**Activity 1: Provide training opportunities for members of POPs working group**

**Output 2: Adapt existing computer technology to establish the MIS for incorporation of research findings and coordination of the process of pesticidal POPs reduction and phase-out.**

This process will involve:

- (1) collection and classification of relevant internal and external information on pesticidal POPs;
- (2) information classification of POPs supply (including general introduction, detailed information, technological processes, technical economic index, liaison information, etc.);
- (3) information classification of POPs substitutional (phase-out) technology demand (including general introduction, ability of production and consumption, environmental demand and discharge standards, liaison information, etc.);

(4) collection and classification of relevant investment information, etc.

**Output 3:        Establish a long-term experts working group that will support SEPA in the implementation of the POPs Convention in China.**

### **3. Outcome of the project**

The immediate outcome of this two year project, with particular reference to the immediate objective one, is to contribute to the formulation of the National Implementation Plan (NIP) with respect to pesticidal POPs. Once part of the NIP, the implementation of the outputs of this projects will be achieved through the assistance of the Global Environment Facility (GEF). By the presentation of the NIP to the GEF, SEPA will guarantee the involvement of the Sino-Italian Cooperation Program (SICP).

### **4. Management and Implementation Arrangements**

The United Nations Development Programme (UNDP) has been invited as the international implementation agency for this project, in cooperation with the United Nations Office for Project Services (UNOPS). The project will be implemented under the framework of a Memorandum of Agreement between the Government of Italy and UNDP for the provision of services by UNOPS. UNDP shall be represented by the Country Office in Beijing, and at Headquarters, by the Environmentally Sustainable Development Group (ESDG) of the Bureau for Development Policy (BDP). The China State Environmental Protection Administration (SEPA) is the Government co-ordinator for the POPs Convention, and as such, will designate its Foreign Economic Cooperation Office (FECO) to be the lead national implementing/executing agency for certain components of this project, and will be responsible for all investigations in relation to Immediate Objective 1/Output 1 of the project.

The institutional framework for this project also includes key actors such as the State Economic and Trade Commission, Ministry of Agriculture (and its Institute for the Control of Agrochemicals), Ministry of Health, Association of Chemical Industry, and State Power Corporation. It is therefore essential that the lead national agency consult and collaborate closely with other line ministries with view to the consolidation of project findings into the NIP.

Project activities will operate under the overall technical guidance and supervision of the Project Management Office (PMO) to be based at the Italian Trade Commission – Beijing (ICE Beijing), comprising Chinese and Italian experts. One Italian expert in the field of pesticidal POPs will be contracted for the whole duration of the project and will also act as Technology Advisor of the project. The expert will liaise closely with the National Expert within FECO/SEPA regarding all technical components of the project.

UNOPS will be responsible for the general and financial administration of the project. More specifically, UNOPS will be responsible for implementation of internationally based and/or sourced activities. Responsibility will be shared with FECO/SEPA with respect to the implementation of domestically based and/or sourced activities; the administration of national consultancy contracts and their travel will be the primary responsibility of FECO/SEPA.

A breakdown of responsibilities between SEPA and UNOPS is attached to this document as Annex II.

## **5. Monitoring and Evaluation, Reporting**

UNDP will be responsible for monitoring and evaluating project objectives, outputs and activities, and emerging issues. UNOPS will be responsible for consolidating technical/substantive and financial reports under the project, and reporting to the Italian Government. Annual Four-party Review Meetings will be held.



## Project Budget

### **CPR/01/R51 - Strategy and Program on Reduction and Phase-out of Pesticidal POPs in China**

BL	Description	Total in US \$ For Yrs 1 & 2	Total in EURO For the Yrs 1 & 2
10	Project Personnel		
1151	International Consultants (+ 2m/m)	165000	194040
1197	International Consultants (-2m/m)	200000	235200
19	Component Total	365000	429240
20	Subcontracts		
2101	Memorandum of Agreement with SEPA/FECO for administration of national consultant contracts and travel	704000	827904
2102	Subcontracts	80000	94080
2103	Subcontract - MIS system building	75000	88200
29	Component Total	859000	1010184
30	Training		
3201	Training - inventory methodology and investigation	80000	94080
3202	Training – capacity building, infrastructure	30000	35280
3203	Training/Study Tour – alternative technology	40000	47040
3204	Training/Study Tour – management systems	40000	47040
3205	Domestic Workshop – strategy and NIP formulation; convention implementation	30000	35280
3206	International Workshop – strategy and NIP formulation; convention implementation formulation	65000	76440
39	Component Total	285000	335160
40	Equipment		
4501	Office Equipment	40000	47040
4502	Equipment – MIS	75000	88200
49	Component Total	115000	135240
50	Miscellaneous		
5201	Reporting/Publications/Translation	20000	23520
5301	Sundries	6000	7056
59	Component Total	26000	30576
90	Project Total	1650000	1940400

Note:

Budget to be broken down into two years following receipt of detailed timeline for activities

The UN rate of exchange used for EURO is 1 US \$ = 1,176 EURO

## **ANNEX I: SCHEDULE OF OUTPUTS AND ACTIVITIES**

### **Immediate Objective 1: To develop a strategy and programme for the reduction and phase-out of pesticidal POPs.**

Output	Activities	Timeframe	Indicator/Deliverable
Preliminary sources/emission inventories of pesticidal POPs, focusing on production, distribution, use, import and export of pesticidal POPs	1. Inventory investigation on production of pesticidal POPs	12 months	Report on production of pesticidal POPs
	2. Inventory investigation on distribution and use of pesticidal POPs	12 months	Report on distribution and use of pesticidal POPs
	3. Inventory investigation on import and export of pesticidal POPs	12 months	Report on import and export of pesticidal POPs
	4. Inventory investigation on obsolete pesticidal POPs	12 months	Report on obsolete pesticidal POPs
Assessment of potential pesticidal POPs reduction and phase-out technologies/products, and management and institutional context for management of pesticidal POPs	1. Preliminary investigation of technology for pesticidal POPs reduction and phase-out	Preliminary reports in 12 <sup>th</sup> and 18 <sup>th</sup> months. Final report by 24 <sup>th</sup> month.	Report on substitution technology and analysis of technology options
	2. Assessment of national management system and institutions related to pesticidal POPs, including regulatory control; needs and options for strengthening them	Preliminary reports in 12 <sup>th</sup> and 18 <sup>th</sup> months. Final report by 24 <sup>th</sup> month.	Report on assessment of and recommendations regarding regulatory, management, institutional environment and frameworks under which pesticidal POPs control measures could be implemented
Strategy on reduction and phase-out of pesticidal POPs	1. Through consolidation of findings from activities outputs 1 and 2, formulate strategy and programme for pesticidal POPs reduction and phase-out	First draft in 18 <sup>th</sup> month. Final report by 24 <sup>th</sup> month	Strategy and Programme for reduction and phase-out of pesticidal POPs

**Immediate Objective 2: To strengthen the capacity and infrastructure within the China State Environmental Protection Administration (SEPA) for formulation and coordination of national actions on POPs**

Output	Activity	Timeframe	Indicator/Deliverable
Strengthened capacity of SEPA, particularly the capacity of the national POPs Working Group	1. Training and/or study tours	Ongoing	Participation in training and/or study tours (domestic and abroad)
MIS hardware and software developed for pesticidal POPs reduction and phase-out strategy and programme	1. Adapt existing computer technology to establish MIS 2. Training SEPA staff on use of MIS	During year 2	SEPA equipped with MIS hardware and software; SEPA staff trained in use of MIS
Establishment of long-term expert working group to advise SEPA on implementation of POPs Convention	Establish long-term expert working group	Ongoing	Expert working group established

**Appendix 10:**  
**A Case Study on POPs Alternatives for Termite Control in**  
**China**

## Terms of Reference

### A Case Study on POPs Alternatives for Termite Control in China

#### Background

1. **International Convention on POPs.** The persistent organic pollutants (POPs) that have been found to cause global environmental problem are a group of organic chemicals with semi-volatile character. All of these chlorine-containing compounds have been designated by the United Nations Environment Programme (UNEP) as priority pollutants, based on an overwhelming body of scientific knowledge on toxicological/environmental concerns. The recently established Stockholm Convention on Persistent Organic Pollutants, signed on 23<sup>rd</sup> May 2001, is currently supported by 151 signatory nations, including China, among which 21 countries who have since ratified the convention. Under the Stockholm Convention, chlordane and mirex are among nine Annex A compounds – those that have been intentionally produced. The explicit goal for such compounds (chlordane, aldrin, dieldrin, endrin, heptachlor, hexachlorobenzene (HCB), mirex, PCBs and toxaphene) is the elimination of production and use.

2. The twelve initial POPs included in the treaty include eight pesticides (aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex, and toxaphene), two industrial chemicals (PCBs and hexachlorobenzene), and two un-intentional by-products of combustion and industrial processes (dioxins and furans). Among them, Chlordane and Mirex are mainly used as effective termiticides for termite control.

#### Introduction on POPs termiticides

3. Chlordane and mirex are broad-spectrum pesticides that at one time were used extensively in many parts of the world. Chlordane, which is actually a complex mixture of several chlordane isomers, has been used historically for insect control on agricultural crops and lawns, for fire-ant control, and for other insect pests.

4. One of the major categories of past and current usage on a global scale of chlordane and mirex is for the control of termites, which are among the top five most important insect pests globally. In fact, five of the twelve POPs covered under the Stockholm convention have been used extensively for termite control, including aldrin, chlordane, dieldrin, heptachlor, and mirex. Based on this, an international group of experts met in Geneva on February 1-3, 2000, to discuss sustainable termite control strategies based on alternatives to POP use, at a venue sponsored by the Chemicals Unit of the United Nations Environment Programme (UNEP), the Plant Protection Service of the Food and Agriculture Organization of the UN, and the Global Integrated Pest Management Facility.

5. There are approximately 2,000 described species of termites world-wide (comprising the insect order Isoptera in its entirety), living mainly in tropical and subtropical areas, although there are a number of temperate species as well. Hundreds of species have now been recorded in China. There are formal observational records of termites in all provinces except Heilongjiang, Jilin, Inner Mongolia, Ningxia, Qinghai, and Xinjiang in mainland of China. The area of termite distribution accounts for 40% or more of the total land area in China and tends to parallel areas of more intense human settlement and activity.

6. The human health and environmental risks of chlordane and mirex are due to a combination of long-term environmental persistence, ability to be transported over very long distances in the atmosphere and in water, tendency to bioconcentrate in living organisms and biomagnify from the bottom to top of food webs, and toxicity to humans and other forms of life.

7. Global POPs sources based on historical as opposed to current or future use are also a problem since such chemicals tend to cycle many times through the environment. For example, chlordane compounds are still found routinely in solids from sewage treatment plants in the southern United States, which are subsequently applied on agricultural lands as fertilizer. This in spite of the fact that use of chlordane and mirex have been banned for more than a decade in the same areas. Chlordane and mirex are no longer detected in treated sewage sludge in British Columbia, probably due to the lesser amounts used than in the U.S. It is anticipated that chlordane-contaminated soils and sediments in parts of the world where there was heavy past use will serve as sources to the global atmosphere for some time into the future, and importance of such sources also needs to be addressed

8. Canada has made a leading contribution to promulgation of the Stockholm Convention on Persistent Organic Pollutants. The country has a continuing role to play, and is in a good position, to find alternatives that will both end the use of POPs and either maintain or increase the efficacy of pest control. Canadian scientists initially identified the problem, and along with the policy makers, need to assist with finding appropriate technological solutions that respect the unique socioeconomic conditions of countries that still rely on some of the POPs to some extent. Research in the mid-1980s by Canadian scientists highlighted in the issue of long-range atmospheric transport to arctic ecosystems, and biomagnification in food webs which include humans. A massive amount of information has since been gathered internationally, which collectively has highlighted the massive geographical extent of the problem and associated far-reaching risks.

## Situation Analysis

9. **Chlordane Use in China.** Termites are important contributors to the recycling of dead and decaying wood in natural systems. In the built environment, however, several species are known to attack wooden structures and tree plantations, potentially resulting in massive problems economically and more directly in terms of human safety and well-being. It has been estimated that termite damage in China would result in approximately \$1.8 billion Yuan RMB dollars in economic loss per year, without the use of chlordane as termite control agents. Centrally-coordinated termite control strategies, supported by the Chinese government, have been carried out in most provinces since the mid-1980s, in order to protect wood-construction buildings and dams, forestry and orchard operations, and communication facilities. There are currently more than 800 termite control stations in China, and 10,000 termite control operators. Approximately 150 million square meters of land area (150 km. sq.) are subjected to termite control each year. China is largely self-sufficient as a chemical producer, and there are several currently sanctioned and some unlicensed chlordane production facilities. We are not aware of any formally prepared annual production estimates for chlordane in China.

10. In the United States, a common practice in several parts of the country prior to a ban on chlordane use in 1988 was to apply very high concentrations of chlordane on foundation soils before building houses, apartments, and other buildings, in order to create a chemical barrier against termite introductions. Subsequent studies have shown that a high proportion of houses built since between the 1950s and 1980s continue to contribute to human exposures at levels that can result in elevated incidence of cancer, neuroblastoma, leukemia, infections, bronchitis, asthma, sinusitis, infertility, neurological disorders, aggression and depression. The initial chlordane applications can continue to cause problems for non-target species, especially humans, decades after the initial use.

11. Concerns about chlordane are at least two-fold: First, there is reason to be concerned about health effects on humans directly exposed as applicators of chlordane or those who live and work in environments contaminated with chlordane (e.g. via the indoor air or through incidental soil ingestion). Second, chlordane is especially prone to move through aquatic food webs and accumulate in very high concentrations in fish tissue that is rich in fats, including omega-3 unsaturated fatty acids that provide great dietary value to humans. Human populations that rely more heavily on fish for their overall dietary needs are more at risk from POPs such as chlordane.

12. The detailed studies haven't yet been identified on chlordane and mirex. concentrations in the built, agricultural, or natural environment of China and that the scope of the issue has yet to be ascertained. China is one of the countries that contributes to the global mass balance of chlordanes through the quantities used every year for pest control, as well as the amount already released and present in the local environment, especially to soils where chlordane was applied directly for the control

of termites and other pests. Mirex is also used. Published estimates for China of annual use inventories and inter-annual trends are available for DDT and hexachlorocyclohexane (Li *et al.*, 1998, 1999, 2001) based on work by researchers from Environment Canada, Nanjing Institute of Environmental Studies, and UNEP/GRID. The inventory data were provided based on studies arranged for Environment Canada by the International Register of Potentially Toxic Chemicals of the United Nations Environment Programme (IRPTC/UNEP) (Cai *et al.*, 1992). No similar data yet exist for chlordane.

**13.** It is clear that termites threaten critical infrastructure, including housing, communications, watershed management and the annual production rates of foods. A diminished ability to control pests is not a viable option, therefore, due to the expected direct impacts on human health, and economic well-being, as well as an anticipated increase in the need for compensatory capital expenditures that could run into the tens of millions of dollars annually.

**14. Alternative Technologies.** The United Nations Environment Programme maintains a searchable database<sup>1</sup> on a very large number of available alternatives to chlordane and mirex for pest control, and strategies to limit economic losses and human health risks (Annex A) variously include (i) chemical alternatives, (ii) biological control agents, (iii) physical barrier systems, (iv) integrated pest management, and (v) environmental management systems. In jurisdictions that have already eliminated chlordane and mirex use, there was an initial switch to other organochlorine pesticides (most if not all of which are also covered under the Stockholm POPs convention) followed by changes to organophosphate and pyrethroids. Chlorpyrifos (Dursban), a trichlorinated organophosphate compound, was used heavily in N. America for termite control up to the time of its ban by the USEPA for household use in 2000. The recent controversy in North America surrounding chlorpyrifos use and human health risks highlights the need to explore the range of options, not just chemical alternatives. In some instances, a switch from POPs pesticides to less persistent non-chlorinated pesticides has been accompanied by equivalent or greater toxicological risks at or near the point of application. Australia has on a nation-wide basis examined termite control problems seriously within the last decade, and manages termites based on a combination of construction design recommendations and integrated pest management strategies. A choice of sustainable alternatives will need to consider not just persistence but also the amount of pesticide applied relative to the benefits.

**15. Constraints to Adoption of Alternative Technologies and Total Elimination of Chlordane.** Termiticides presently used in China are mainly chlordane and mirex. Chlordane is predominantly used for the prevention of termite damage by limited early stages of colonization into wood structures (i.e., as a

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<sup>1</sup> <http://dbserver.irptc.unep.ch:8887/irptc/owa/ini.init>



chemical barrier), while mirex is mainly used for the control of termite damage once infestations are discovered. Given the known problems with chlordane and mirex, any viable alternative for termite control would be widely accepted. The Chinese government, however, requires that a period of efficacy of termiticides applied for prevention must be over 15 years, while virtually all chemical alternatives such as pyrethroid insecticides, imidacloprid, and chlorpyrifos tend to have a more limited environmental persistence that limits their effectiveness in termite control to less than ten years following applications at rates that are typically used. In addition, the monetary costs of chemical alternatives to chlordane are very high in comparison. The physical and chemical characteristics of soil in China are different from western countries, where alternative termiticides have been used. Chinese operators, therefore, do not know if they are suitable or not for termite control in China.

16. Any possibility of eliminating chlordane and mirex from production and use in China will require not just a consideration of technological alternatives, but also issues associated with education and training, public awareness of risks, regulatory/management regimes, pesticide production and distribution infrastructure, and building practices and design.

17. China is a rapidly evolving nation, which has formally and repeatedly recognized that the long-term well-being of its large population can only be guaranteed through a major focus on environmental sustainability. Under the Stockholm Convention developed countries such as Canada have committed to assist developing nations augment their capacity to reduce or eliminate POPs. The challenge in preparing safer and more environmentally safer alternatives to chlordane and mirex use in China is significant.

### **Context**

18. UNIDO is now focusing on a GEF PDF-B project as an initiative enabling activities before NIP (National Implementation Plan) is to be formulated. UNIDO is expected to take the lead in the formulation of the NIP on POPs for China under the GEF guideline. Concurrently, with the support of an Italian grant, China has started to develop Strategy and Program on Reduction and Phaseout of Pesticidal POPs, which will eventually be incorporated in the NIP. In this project, inventories on production, distribution, storage, import & export, etc. of POPs pesticides will be completed, including the termiticides chlordane and mirex.

### **Objectives**

19. The overall objective of this Pilot Project is focusing on the first stage of the general objectives listed above and to facilitate the elimination of chlordane and mirex use in China and provide suggestion and experiences on economically and environmentally sound alternatives for termite control in China. Some of the objectives of the overall strategy for developing a National Implementation Plan for

the curtailment of chlordane and mirex use for termite control include:

- a. Development of the appropriate Integrated Pest Management (IPM) for termite control in the selected pilot site; and
- b. Identification of most suitable alternatives that might be used within or outside of an IPM framework to replace chlordane and mirex.

The outputs of this project will be integrated into the development of a pesticide strategy and program in the NIP of China.

**20. Proposed Project Activities:**

- a. Collect information about the use of mirex and chlordane, the alternatives and IPM practice for termite control in China and in other countries.
- b. Review the information collected, select the two pilot sites -- cities or municipalities which have reasonable statistics on serious affects/damage by termite, and where mirex or chlordane have been heavily used. Develop the work-plan for the study through an experts' workshop.
- c. Collect historical data and currently available information on termite damage; usage of pesticide and outcome on pilot sites. Identify major domestic constrain for the elimination of chlordane and mirex.
- d. Select some small areas for the trial application of different known alternatives to identify the most appropriate alternative for the pilot sites.
- e. Develop an appropriate IPM for termite control for the pilot sites.
- f. Evaluate the feasibility of IPM practices for termite control in other areas in China. Make recommendations for actions that can be pragmatically implemented on a nation-wide basis in order to achieve the objectives of the Stockholm Convention on Persistent Organic Pollutants through a series of follow-up projects and actions.

**21. Proposed Implementation Plan.** The project is expected to be completed within two & half years after (a) the Letter of Agreement between China and the Bank has been signed and becomes effective, (b) and the funds for the special account have been deposited into a FECO/SEPA account for this project. Proposed implementation schedule is detailed in Annex 1. However, implementation schedule could be adjusted based on actual project progress.

**22. Project Deliverables.** Based on project objectives and activities, deliverables are expected to be:

- a. General status report on the use of mirex and chlordane, the alternatives and IPM practice for termite control in China,
- b. Status report and suggestion on the most suitable alternatives in the pilot sites, and
- c. IPM for termite control in pilot sites, and
- d. Report on feasibility of newly developed IPM for termite control to be adopted

23. **Management and Implementation Arrangements.** The World Bank has been invited as the international implementing agency for this project. The project will be implemented under the framework of a Letter of Agreement between FECO and the World Bank. The Department of Environment and Social Development in the East Asia and Pacific Region in the headquarter of the World Bank in Washington D.C will be responsible for monitoring and evaluating project objectives, output and activities, and emerging issues. The Bank will also be represented by its Beijing office in China.

24. The China State Environmental Protection Administration (SEPA) is the Government co-coordinator for the POPs Convention, and as such, will designate its Foreign Economic Cooperation Office (FECO) to be the lead national implementing /executing agency of this project and will be responsible for all activities related to outputs of this project. SEPA/FECO will consult and collaborate fully and closely with all other ministries and organizations with the view of consolidating project findings into the NIP.

25. The experts from Canadian Royal Roads University will participate in the project as international consultants to assist China in the implementation of this project.

26. **Reporting requirements.** Prior to start of project, the PMO/FECO and the Bank will agree on a semi-annual reporting format. FEEOC will provide the Bank a semi-annual progress report on project implementation status once the project has started. If necessary, the progress report will provide justification for any changes in proposed activities. The Bank is responsible to provide regular reporting to the Canadian Government on project progress.

27. **Budget.** The total budget of project for China is US\$270,000. Among them, US\$250,000 will be funded by the Canadian Trust Fund, and the remaining US\$20,000 will be contributed by SEPA in-kind in terms of personnel, office and facilities, etc.

<b>Budget Items</b>	<b>US\$</b>
National consultants for collection of information on termite control	10,000
Trial, IPM development and evaluation of feasibility of IPM practices	190,000
Experts workshop	20,000
Communication, travel and report, etc	30,000
<b>Total contribution from the Canadian Trust Fund</b>	<b>250,000</b>
Chinese contribution in terms of personnel, office and facilities	20,000
<b>Total project cost</b>	<b>270,000</b>



## Annex 2

## Proposed Implementation Plan and Budget for the Termite Study

No.	Activities	Description of Activities	Proposed date	Deliverables	Proposed Budget (in U.S dollar)
1	Experts Workshop	Review the information collected, sites selection, develop the workplan for the study	September 2002 to March 2003	Workshop minutes including work-plan for the study	20,000
2	Collection of information	Collect information about the use of mirex and chlordane, the alternatives and IPM practice for termite control in China and in other countries.	September 2002 to June 2003	Status report	5,000
3	Information collection on pilot sites	Detail data collection on termite damage, usage of pesticide and outcome on pilot sites. Identify major domestic constrain for the elimination of chlordane and mirex.	July 2003 to June 2004	Status report on pilot sites	5,000
4	Trial application of alternatives in the pilot sites	Select some small areas for the trial application of different known alternatives to identify the most appropriate alternative for the pilot sites	May 2003 to October 2004	Suggestion on the most suitable alternative(s) in the pilot sites	190,000
5	IPM development for termite control in pilot sites	Development of an appropriate IPM for termite control in the pilot sites	May 2003 to October 2004	IPM for termite control in pilot sites	

No.	Activities	Description of Activities	Proposed date	Deliverables	Proposed Budget (in U.S dollar)
6	Evaluate feasibility of the IPM	Evaluate the feasibility of IPM practices for termite control in other areas in China	September to December 2004	Report on feasibility of newly developed IPM for termite control to be adopted in other areas of China.	
7	Final report		By the end of March 2005	Final project report	30,000 (including communication, travel for FECO staffs, printing cost, material preparation, etc)
Total from the Canadian Trust Fund					<b>250,000</b>
Government contribution in kind					20,000
<b>Total project cost</b>					<b>270,000</b>