

Thailand

Chemicals Management Profile 2005

**Subcommittee on Policy and Plan
under the National Coordinating Committee
on Chemical Safety**

October 2005



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**The National Subcommittee on
Policy and Plan for Chemical Safety
October 2005**

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EXECUTIVE SUMMARY

The Thailand Chemicals Management Profile 2005 is an important component of the national information system, prepared to communicate information about all existing structures and implementations relating to chemicals management in Thailand. The scope of the national profile covers available facts and information for the period of 1998 to 2004, presented in 12 chapters according to UNITAR guidelines. The valuable tangible output and outcome of this effort will form the basis for the development of the 3rd National Master Plan on Chemical Management and capacity building programs, expected shortly after the preparation of the national profile. It is expected to provide insights on decision-making processes to guide Thailand towards sustainable development and to maintain pace with the dynamics of the world economy and international relations.

Background Information about Thailand

A country located in the heart of Southeast Asia, Thailand is comprised of 76 provinces with a total area of 513,000 square kilometers and a population of 65 million, using Thai as the official language. Lifestyle and consumption patterns of the Thai people in general are modernized and to a great extent follow the Western influence.

The country's government is formed according to the democratic principles of the parliamentary system and constitutional monarchy. Apart from the fundamental state policies to strengthen national stability and to promote the sound development of the society and the economy, the current government's policies focus on the promotion of democracy and civil society processes through public participation and power decentralization to local authorities.

Over the past years, Thailand has restored its economic stability after the crisis. Economic growth rates of 6.9% and 6.1% were reported for 2003 and 2004 respectively. Apart from the two major sectors constituting the economic structure – agriculture and industry (manufacturing) – the service sector has been rapidly developed, especially tourism and other services based on traditional skills or products. The rapid expansion of the non-agricultural sector has attracted rural people to concentrate in the urban areas. However, the “Dual Track Policy” adopted by the current government aims to stimulate the economy at the level of grassroots and small- and medium-sized enterprises. The “One Tambon (subdistrict) One Product” (OTOP) scheme has successfully been launched nationwide and has substantially raised the quality standard of local and indigenous products.

The agricultural sector still provides a living for the majority of Thai people in the rural areas. Rice, cassava, sugarcane, rubber, and fruits are among the major crops grown in various regions of the country for local consumption and for export. Fish and fishery products are also exported in significant amounts in the form of frozen or processed products.

Chemical Production, Import, Export, and Use

Thailand imports various chemicals for direct use (in household and for industrial and agricultural purposes) and for production of further value-added products. In 2003, about 5,200,000 tons of industrial chemicals were imported for manufacturing, whereas the export quantity was 3,077,000 tons. The high domestic consumption of pesticides, herbicides and fertilizers is illustrated by the amount imported as finished products, formulated products for local packing, and active ingredients for local formulation.

A total of 45,025 million liters of crude oil was imported in 2003 for local refineries to produce diesel and gasoline to serve domestic demand, and only a small portion was exported. Most of the petrochemical products are produced by companies located along the eastern seaboard, in the amount needed to meet local use and export.

Chemical substances are used for control of disease vectors in high-risk areas, specifically for controlling malaria (deltamethrin and permethrin) and dengue (temephos). The use of DDT for malarial control was finally phased out in 2002. In recent years, new epidemic diseases, such as severe acute respiratory syndrome (SARS) and avian influenza (bird flu) emerged periodically, drawing great attention in epidemic control and prevention.

The continuing economic growth and modern lifestyle in turn has generated various types of waste. Over 14 million tons of domestic waste was reported for 2003, with 20% collected in the Bangkok area. The Department of Industrial Works estimated that an amount of 1.2 million tons of hazardous waste being generated from industrial sources. New facilities for handling these wastes have been promoted but are still inadequate. Information on waste generation and handling was obtained from either databases or studies by relevant agencies officially responsible for the particular type of waste.

Priority Concerns Related to Chemical Production, Import, Export, and Use

Problems related to chemical production, import, export, and use were identified and prioritized for the environmental and health areas.

High priorities of concern are air pollution from vehicles, construction, and industries; occupational health problems from agricultural activities (insecticides and herbicides); chemical residues in food (pesticides, chemicals, and veterinary drugs); and chemical accidents from industry and transport.

Medium-rank problems include air pollution from power plants and petroleum stations; hazardous waste treatment and disposal; occupational health problems occurring in industrial and SMEs' activities; drinking water contamination; adverse reactions to health and consumer products; and import of unknown chemicals.

Other problems in environmental areas are air pollution and occupational health problems in healthcare and service workplaces; soil and water (inland waterways, coastal areas, and ground water) contamination by insecticides, herbicides, and heavy metals; and public health problems, specifically, residues of banned chemicals in traditional medicines and chemical poisonings/suicides.

The problems are addressed by the responsible agencies and relevant regulatory bodies, namely the Ministries of Public Health, Agriculture and Cooperatives, Natural Resources and Environment, Labour and Social Welfare, and Industry. In essence, an effective management scheme at the national level requires a strong coordinating effort and deserves to be seriously considered as a high priority since chemical management has become an issue affecting trade and economic expansion as well as social well being.

Legal Instruments and Non-Regulatory Mechanisms for Managing Chemicals

A number of legal instruments have been enacted to control the use of chemicals and reduce chemical risks to human health and the environment: four ministerial notifications, one ministerial rule, one decree, and 13 acts. Among these are:

- The *Enhancement and Conservation of National Environmental Quality Act 1992* and the *Public Health Act 1992*, covering the prevention and management of all aspects of danger and nuisance caused by pollutants.
- *Food, Drug, Cosmetic, Medical Device, Narcotic and Hazardous Substance Acts*, covering articles meant for the safety of human and animal consumption. Uniquely, there are three ministries, i.e. Ministries of Industry, Agriculture & Cooperatives, and Public Health, sharing the responsibilities for executing the *Hazardous Substance Act 1992*, each in the area relating to its authority.
- The *Factory Act of 1992* seeking to control factory operations regarding waste disposal, pollution emission and contamination with the main objective of minimizing the impact on the environment.
- Several *Notifications* of the Ministry of Interior concerning occupational safety.
- Three legal instruments recently enacted: *Notification of Hazardous Substance Committee regarding Land Transportation of Hazardous Substances (2002)*; *Notification of Ministry of Commerce regarding Importation of Pharmaceutical Chemicals into Thailand (2002)*; and *Rule of the Prime Minister Office on National Disaster Prevention (Amendments 2000 and 2003)*.

Ten ministries are responsible for overseeing the enforcement of the legal instruments, with their respective areas of responsibility based on chemical use category. The major act related to chemicals management is the Hazardous Substances Act (1992), which conferred relevant authority on seven government agencies. Hazardous substances

are classified into four types according to the needs for control. The Hazardous Substance Act promulgates lists of banned and severely restricted chemicals for particular conditions of use in agriculture, public health, personal consumption, and household use.

Ministries, Agencies, and Other Institutions Managing Chemicals

There are at least nine ministries entrusted with the responsibilities of enforcing related laws, regulations, and other operational guidelines. They are, in alphabetical order: Agriculture and Cooperatives, Commerce, Finance, Industry, Interior, Labour, Natural Resources and Environment, Public Health, and Transport. Information provided in the national profile give an overview of ministerial responsibilities in managing three groups of chemicals considered vital for Thailand – namely pesticides, industrial chemicals, and consumer products – in various phases of their life cycles.

Because chemicals are widely used for varying purposes, the many ministries conduct their mandate using their own systems and protocols, which often becomes an obstacle for effective chemical management due to the unavailability or incompleteness of necessary information and data.

Several attempts have been made to set up a national harmonized system to manage chemical safety through operational research. Achieving success will rely heavily on establishing an effective partnership among involved government agencies, academic institutions, industries, and other stakeholder groups and coordinating leadership.

Relevant Activities of Industry, Public Interest Groups and the Research Sector

As Thailand moves ahead to regain its economic expansion, the private and non-governmental sectors have increased their participation in various ways. In the area of chemical management, there are a number of fully dedicated organizations.

Two industry-related entities, namely the Chemical Industry Club of the Federation of Thai Industries and the Thai Crop Protection Association, have carried out various activities to keep their members up to date with knowledge and information necessary for operating their businesses in a responsible manner and for a sustainable future. They also are involved in policy-setting processes organized by the relevant agencies.

Public interest groups have emerged with focuses on specific issues concerning chemical hazards and safety management, such as occupational health and safety, industrial pollution, social and environmental justice, agricultural alternatives, and clean technology. Their activities encompass information dissemination, research and outreach, monitoring, campaigning for community rights, and community capacity building.

Regarding academic and research activities, most universities in Thailand teach and conduct research related to diverse aspects of chemistry and/or chemical use, including

chemical safety and environmental protection. Specifically, the Chulabhorn Research Institute focuses on environmental toxicology and health risk assessment from pollution and chemical contamination while the National Research Center for Environmental and Hazardous Waste Management concentrates on the impact, treatment, and management aspects of hazardous substances and waste. Research progress in Thailand has been remarkable with the encouragement and support of the Thailand Research Fund, a research funding agency that has been officially designated in the Thailand's Second National Master Plan on Chemicals Management (2002 – 2006) to coordinate research and development for chemical safety.

Inter-ministerial Commissions and Coordinating Mechanisms

Two mechanisms are being used to get cooperation from various agencies and organizations to execute tasks or carry out activities within the scope of chemical management. These coordinating mechanisms are:

1. Inter-ministerial bodies, appointed by the Cabinet to undertake policy formulation, monitoring, and evaluation as well as decision-making regarding respective chemicals. The National Coordinating Committee on Chemical Safety is an example of the inter-ministerial body in charge of developing a national master plan for chemical management.
2. Standing Committees, established by the acts to carry out various aspects of regulation and management of chemicals throughout their lifecycle. These include the National Environment Board, the Pollution Control Committee, and the Committees on Drugs, Food, Cosmetics, and Hazardous Substance.

A special coordinating mechanism has been demonstrated in Thailand: the research platform. It has increasingly offered opportunities for the involved organizations and interested individuals to interact and share their ideas and experience with the aim to create knowledge and generate applications for the findings. The Thailand Research Fund has played a leading role in coordinating and supporting policy research and public forums in many cross-cutting issues concerning chemical safety and chemical management.

Data Access and Use

International literature and databases on chemical safety management are accessible in many formats and systems from universities and government agencies and through the Internet, covering statistical data, research information, data from production enterprises, and international information. Because many agencies are mandated to oversee chemical management relevant to their functions, they collect and analyze information on chemical management in Thailand for specific purposes in their own design and format; hence, the data are not generally collected and recorded in a consistent and comparable fashion.

The national chemicals management profile is expected to raise this concern and stimulate a mechanism to ensure the availability and reliability of systematic information. The development of an inter-organizational network that shares the responsibility of acquiring quality information without repetitive effort has been an issue of discussion in the national master plan but needs strategies to expedite the process. Dissemination of the available information to the public for better awareness and understanding is also a key step for safe handling and sustainable consumption of chemical products.

Technical Infrastructure

Diverse laboratory infrastructures are located at various ministries and universities for diverse purposes: research, analytical service, hazard monitoring, litigation, risk assessment, registration, permission granting, substance control, certification, diagnosis, and so forth. These technical infrastructures can be divided into four categories regarding chemical control and regulation: agriculture, public health, industry, and environment. Laboratory service is also provided by the private sector, mostly to industries.

Most of the laboratories in Thailand apply the international standards for laboratory quality management system: ISO/IEC 17025, ISO 15189, and OECD-GLP. Cooperations between laboratories in the Southeast Asia region (ASEAN) are ongoing in various areas, such as the standard solution for pharmaceutical (ASEAN reference standards) and chemical analysis proficiency testing schemes.

International Linkage

Thailand is a member of numerous international programs/agreements: Agenda 21, UNEP London Guideline, FAO Code of Conduct, Montreal Protocol, Basel Convention, and GATT/WTO agreements. It has good linkages with international organizations such as IFCS, IPCS, UNEP, IRPTC, WHO, FAO, UNIDO, ILO and UNITAR. The focal point for each domain of international cooperation is usually located at the institution or agency considered to be primarily responsible.

Through the international linkages, several projects have been funded and given technical assistance in the areas of chemical safety, risk reduction, environment quality monitoring system, and environmental health impact assessment. Assistance has been provided by various organizations, such as GTZ, IAEA, SIDA, DANCED, ADB, U.S. EPA, JICA, OECC, and JESC.

Thailand has long committed to work for global chemical safety, since the establishment of IFCS in 1994. In the course of participation in the IFCS Forum, Thailand has acquired knowledge and experience and also undertaken a number of initiatives for strengthening national capacity and chemical management scheme. In 2003, Thailand had great honour to host the 4th Session of IFCS (Forum IV) and SAICM Prep Com I

subsequently. Afterwards, Thailand has taken the Presidency of IFCS, vice-president of SAICM (Asia-Pacific region), and continuously involved in the development of SAICM process. This reflects the active interest and commitment of Thailand toward the global agenda for chemical safety.

Awareness/Understanding of Workers and the Public

Workers are considered to be an important component of the sound management of chemicals because they directly handle chemicals in occupational settings. Moreover, the general public, including those living in the vicinity of chemical industry locations and those who are the end-users of chemical products, have the right to gain access to appropriate information that can be applied to their situations. Both workers and the general public need information to enable them to assess the potential risks of the chemicals involved and to make informed decisions. A number of measures have been conducted by both governmental and non-governmental agencies to provide relevant and comprehensive information about chemical risks in order to raise the awareness and understanding of workers and the public. These measures include operations according to regulations, publications, television and radio programs, education, exhibitions, and seminars.

Resources Available and Needed for Chemical Management

The number of personnel and experts present at each institution is basically dependent on the related ministry and budget available. Environmental scientists, physicians, toxicologists, pharmacists, public health officers, nurses, chemists, food scientists, policy analysts, and professionals from many other related disciplines are required for chemical management. In this regard, specific training in the fields of chemical safety, poisoning prevention and treatment, environmental management, toxicology, epidemiology, risk analysis, logistics, conventions and international agreements, socioeconomic and policy analysis, and other related topics is needed to enhance the capability and capacity of the existing human resources.

CHAPTER I

NATIONAL BACKGROUND INFORMATION

1.1 Physical and Demographic Context

Thailand is located in Southeast Asia, bordering the Andaman Sea, the Gulf of Thailand, and its neighbouring countries, the Union of Myanmar, the Lao People's Democratic Republic, the Kingdom of Cambodia, and Malaysia. The land area is 513,115 square kilometres (198,114 square miles) and extends about 1,620 kilometres from north to south and 775 kilometres from east to west. Thailand is bordered by the Andaman Sea, in the Indian Ocean, to the west, the Union of Myanmar to the west and north, the Lao People's Democratic Republic to the north and east, the Kingdom of Cambodia and the Gulf of Thailand to the east, and Malaysia to the south. The terrain of Thailand consists of a densely populated central plain, the northeastern plateau, a mountain range in the west, and a southern isthmus, which joins the land mass with Malaysia. There are three seasons in Thailand: summer, rain, and winter. The tropical monsoon is the dominant climate. The administration is a constitutional monarchy with a parliamentary form of government. Thailand's population is relatively homogeneous. Buddhism is the official religion of Thailand and is the religion of about 95% of its people. The government permits religious diversity, and other major religions, including Christianity and Islam, are represented.

Population:

- Total population for the year 2003 was 63,079,765¹, a 1.94% increase from 2000 (Figure 1.A).
- The population is mostly rural, concentrated in the rice-growing areas of the central, northeastern, and northern regions. As Thailand continues to industrialize, its urban population, located principally in the Bangkok area, is growing² (9.27% of total population in 2003)¹.
- Distribution of population by age group in the year 2003¹ (Thai nationals living in registered households only):

Under 15 years	22.3 %
15 – 44 years	51.9 %
45 – 74 years	23.5 %
³ 75 years and over	2.4 %

¹ Department of Provincial Administration, Ministry of Interior

² National Statistical Office, Ministry of Information and Communication

³ National Economic and Social Development Board

- Live birth rate was 12.5 per 1,000 people and the death rate is 6.1 per 1,000 people in 2002.
- Life expectancy was 65.2 years for males, 73.4 years for females in 2002.
- Unemployment rate was 2.43% in 2002 and 2.24 % in 2003.
- Average income per year was 85,951 baht in 2002.³

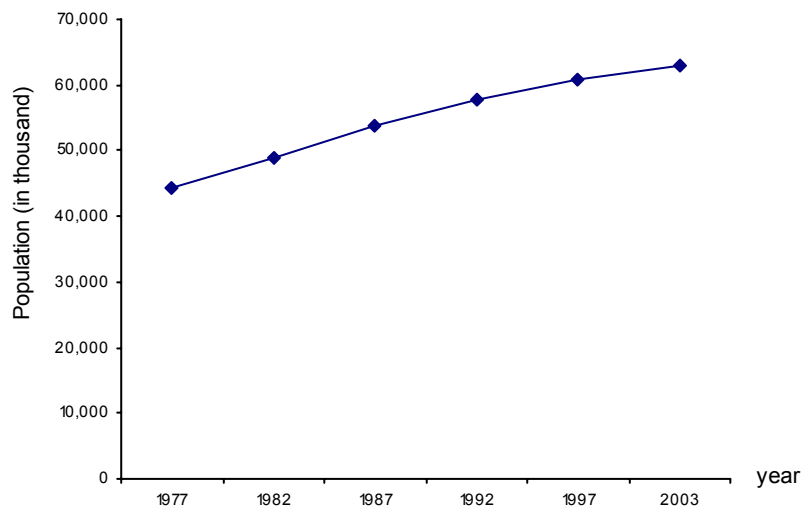


Figure 1.A: Population in Thailand between year 1977 and 2003

(Information adapted from Department of Provincial Administration, Ministry of Interior)

Thailand's highly successful government-sponsored family planning program has resulted in a dramatic decline in population growth from 3.1% in 1960 to around 1% today. Life expectancy also has risen, a positive reflection of Thailand's efforts at public health education.

Most of the population resides in the rural areas where the agricultural sector is predominant. The estimation of population in 1991 by the Thailand Development Research Institute showed that approximately 65.9% were farmers while 21.3% were labourers and 12.8% were in business or were professionals. At present, the proportion follows the change of the country's economic structure from agricultural- to industrial-based, although high achievements in agriculture are still maintained and promoted. The employment in the non-agricultural sector has increased to 60% (Table 1.A). A large portion of the rural population migrates to the urban areas to work in the industrial and service sectors. However, the migration rate of workers from rural to urban areas has decreased due to the shrinkage of the industrial sector after the economic crisis in 1997. The closing or downsizing of industries and business workplaces has forced many workers to return to their rural domiciles,

particularly in the north and the northeast. The survey of population migration in 1997 showed that 37.2% of the labour force migrated from urban to rural areas while only 13.4% flowed in the reversed direction. The Urban Development Cooperation Division estimated in 2000 that 35% of the entire population live in the urban areas, particularly in Bangkok and its vicinity as well as in the eastern seaboard, another industrialized area (Figure 1.B).

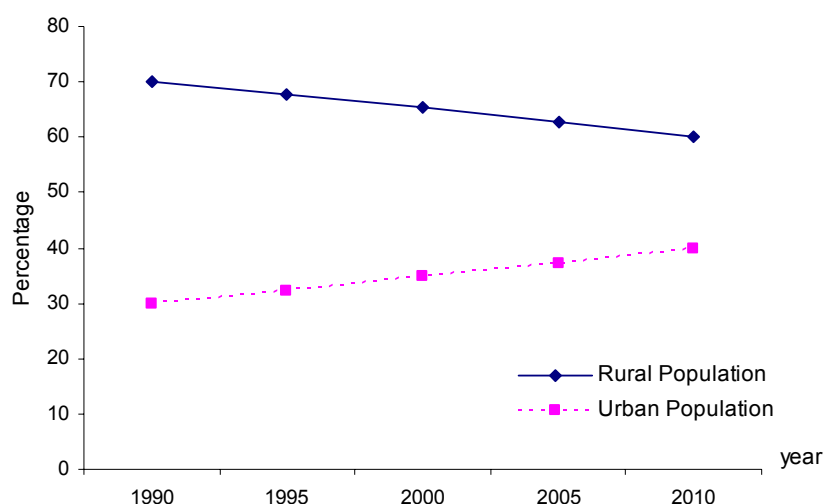


Figure 1.B: Estimates of population in the urban and rural areas

Source: Thailand Health Profile, Ministry of Public Health

Literacy and Education

The constitution has mandated 12 years of free education nationwide. In the past 10 years, the percentage of the labour force with a secondary or higher education has increased although the majority is still comprised of labourers with a primary education or lower. In 2000, 68% of the labour force had a primary education or lower, while 12.7% and 5.7% of the labour force had lower and upper secondary educations, respectively. Furthermore, people with higher and vocational educations accounted for 8.5% and 5.0% of the labour force, respectively. In general, 95.5% of the Thai population is able to read and write Thai language (97.1% for males and 93.9% for females). The urban population has a higher literacy rate than rural areas⁴.

⁴ Department of Provincial Administration, Ministry of Interior

Table 1. A: Overview of Agricultural and Non-Agricultural (Industrial and Service) Sectors (2003)

Sector	Contribution to the Gross Domestic Product (%)^a	Employees (%)^b
Agricultural	10.03	41.91
• Agriculture, Hunting and Forestry	8.27	40.54
• Fishing	1.75	1.40
Non-agricultural	89.97	59.71
• Manufacturing	34.74	15.89
• Wholesale & Retail Trade	15.42	15.59
• Transport, Storage & Communications	7.84	3.15
• Hotel & Restaurant	5.07	6.39
• Finance Intermediation	3.41	0.86
• Electric, Gas & Water Supply	3.22	0.29
• Real Estate, Renting & Business Activities	3.00	1.66
• Construction	2.96	5.57
• Mining & Quarrying	2.61	0.15
• Public Administration	4.42	2.81
• Education	3.72	2.95
• Health & Social Work	1.80	1.55
• Other Community, Social and Personal Service Activities	1.62	2.02
• Private Households	0.13	0.76
Total	100.00	100.00

^a Projected figures. Source: National Economic and Social Development Board.

^b Total number of employees = 33,719,300. Source: National Statistical Office, Ministry of Information and Communication Technology.

Language

More than 85% of the population speak a dialect of Thai and share a common culture. This core population includes the central Thai (33.7% of the population, including Bangkok), northeastern Thai (34.2%), northern Thai (18.8%), and southern Thai (13.3%). The dialect of the central Thai population is the formal national language, taught in schools and used in government. Several other minor Thai-speaking groups include the Shan, Lue, and Phutai.

1.2 Political/Geographic Structure

Thailand is a constitutional monarchy under the Constitution of the Kingdom of Thailand, B.E. 2540 (1997). It is governed by a democratically elected government with His Majesty King Bhumibol Adulyadej as the Head of State. Democracy and the rule of the law are the solid foundation for political, economic and social development in Thailand. It was in 1997 when the New Constitution, generally recognized as “The People’s Constitution”, was promulgated after the struggle for a genuine democratic society for over 60 years. The Constitution clearly established three independent powers: the Legislative, the Executive, and the Judiciary powers. Many new institutions/organisations have been established under the jurisdiction of the Constitution, such as the Constitutional Court, the Election Commission, the Ombudsmen, the Administrative Court, the National Counter Corruption Commission, and the National Human Rights Commission.

Thailand's legal system blends principles of traditional Thai and western laws. The Constitutional Court is the highest court of appeals, though its jurisdiction is limited to clearly defined constitutional issues. Its members are nominated by the Senate and appointed by the King. The Courts of Justice have jurisdiction over criminal and civil cases and are organized in three tiers: Court of First Instance, the Court of Appeals, and the Supreme Court of Justice. The Administrative Courts have jurisdiction over suits between private parties and the government and cases in which one government entity is suing another. In Thailand's southern border provinces, where Muslims constitute the majority of the population, the Provincial Islamic Committees have limited jurisdiction over probate, family, marriage, and divorce cases.

The National Assembly consists of two chambers: the Senate and the House of Representatives. The Senate is a non-partisan body with limited legislative powers, composed of 200 directly elected members from constituent districts, with every province having at least one senator. The House of Representatives has 500 members, 400 of whom are directly elected from constituent districts, and the remainder drawn proportionally from the party lists. The prime minister is the head of government, having a four-year term and chosen by the members of the political party that holds the largest number of seats in the House of Representatives. Under the present electoral system, members of the House of Parliament must resign if they accept cabinet positions. The general elections are under the responsibility of the Election Commission, empowered to oversee polling and prevent fraud.

The current government is headed by Thaksin Shinawatra of the Thai Rak Thai (TRT) Party, who was elected for a second term after the February 2005 election. The twenty ministries in authority are as follows:

1. Office of the Prime Minister
2. Ministry of Agriculture and Cooperatives

3. Ministry of Commerce
4. Ministry of Culture
5. Ministry of Defense
6. Ministry of Education
7. Ministry of Energy
8. Ministry of Finance
9. Ministry of Foreign Affairs
10. Ministry of Industry
11. Ministry of Interior
12. Ministry of Information Technology and Communications
13. Ministry of Justice
14. Ministry of Labour
15. Ministry of Natural Resources and Environment
16. Ministry of Public Health
17. Ministry of Science and Technology
18. Ministry of Social Development and Human Security
19. Ministry of Tourism and Sports
20. Ministry of Transport

Thailand is governed through 76 provinces (“changwat” in the Thai language), with the capital of Bangkok Metropolis. The 76 provinces are subdivided into 795 districts, 7,255 sub-districts (“tambon”), and 69,866 villages. Only the governor of Bangkok is popularly elected, while those of the remaining provinces are career civil servants appointed by the Ministry of Interior. The provincial administrative authorities include ministerial and departmental authorities delegated to each area of the national jurisdiction under the supervision of the provincial governor.

1.3 Economic Structure

The economic structure of Thailand has three main sectors, namely, agricultural, industrial, and service. The agricultural sector is dominant in the rural areas of various regions. The industrial sector is located mostly in Bangkok and its surrounds while the service sector has grown at a rapid rate in many regions of the country in recent years.

The Thai economy is export-dependent, with exports accounting for 60% of GDP. Before the Asian financial crisis, the Thai economy had years of manufacturing-led economic growth, averaging at 9.4%. Relatively abundant and inexpensive labour and natural resources, fiscal conservatism, open foreign investment policies and encouragement of the private sector underlay the economic success in the decade before 1997. The economy is essentially a free-enterprise system. Certain public services, such as power generation,

transportation, and communications, are mostly state-owned and operated, with a rising degree of concession to private sectors.

Thailand's economy has recovered significantly since the economic crisis of 1997. As Figure 1.C shows, in 2003 GDP exceeded the pre-1997 high and showed growth in four of the five years since the depth of the crisis in 1998. Production contributed about 5,930,362 billion baht to Thailand's GDP in 2003⁵. The contribution of the agricultural sector was 10.03% and the non-agricultural sector was approximately 89.97% (about 30% for the industrial sector and about 60% for the service sector) as shown in Table 1.A and depicted in Figure 1.D. Domestic demand, especially private consumption, and exports contributed the most to this growth. Government policies to stimulate private consumption and investment, including a supportive fiscal and monetary policy, as well as progress in corporate and financial restructuring successfully raised domestic demand. The targeting of new export markets, such as China, also raised export earnings by more than 5%.

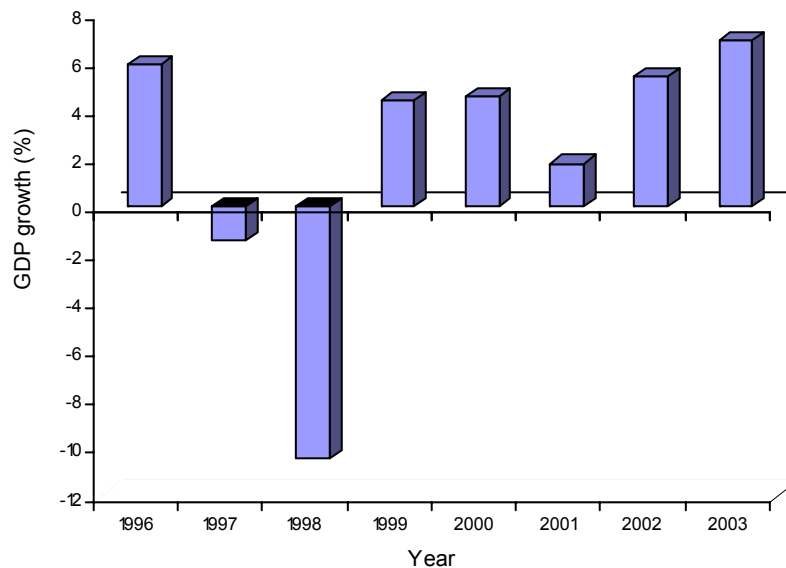


Figure 1.C: GDP growth in Thailand between 1999 and 2003

Source: Adapted from Bank of Thailand and National Economic and Social Development Board

⁵ National Economic and Social Development Board.

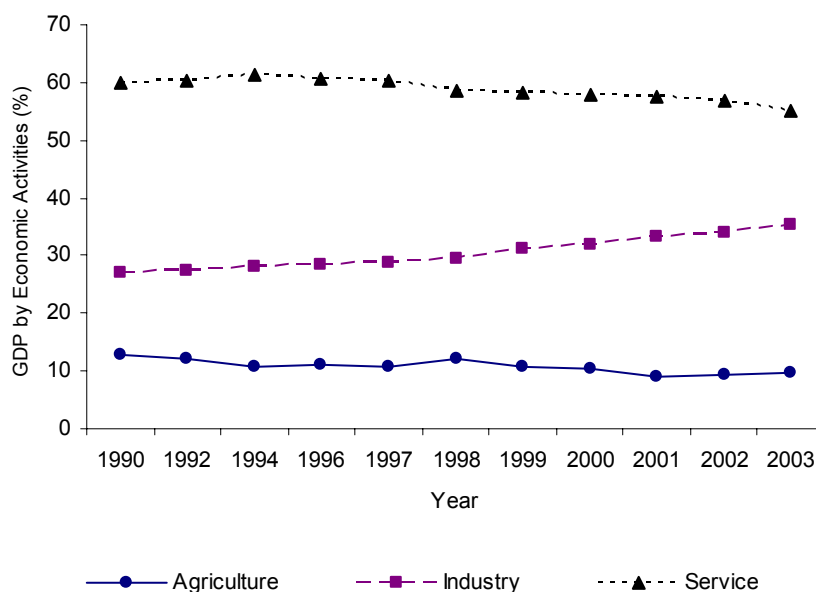


Figure 1.D: GDP by economic sectors between year 1990 and 2003

Source: adapted from Bank of Thailand

Agricultural Sector

With the government's policy to make Thailand the kitchen of the world, supplying commodities and foods, the agricultural products make a significant contribution to the national GDP. The four most important food crops in terms of planted area and value are rice, maize, sugar cane, and cassava. The first three are important domestic food commodities as well as export crops, while the fourth is mostly for export. Thailand is a major exporter in the world rice market. Other agricultural commodities produced in significant amounts include fish and fishery products, tapioca, rubber, corn, and sugar. Exports of processed foods such as canned tuna, pineapples, and frozen shrimp have captured competitive shares of the global markets.

Rice is the most important agricultural product of the nation. It is grown in over 50% of the farmland around the country, particularly in the central and the northeastern plain. There are differences in production yields among the four regions, which may be due to irrigation, soil conditions, or cultural practices. The expansion of cultivation into the land less suitable for rice production has led to growing upland crops such as maize, cassava, and sugar cane. Maize is an important food crop grown in the northeastern part of the country. Cassava, grown mostly in the northeast and in the eastern part of the central region, has become one of the country's top export crops. Sugar cane is for local use and export and is grown mostly in the central region. Other major upland crops include mungbean and soybean in the northern region and kenaf in the northeastern region. In the southern region, rubber is the most important crop, representing a top export commodity after rice and tapioca. Tropical fruits

such as pineapple and longan, and horticultural crops such as orchids are important agricultural products for both local use and export. Fruit crops can be classified into two groups: seasonal and year-round crops. The former includes mangoes, durians, rambutans, longans, sugar apples, mangosteens and lychees. The year-round crops are pineapples, bananas, papayas, and jackfruits. The major fruit-producing areas are mostly in the eastern part of the central region and the southern region of the country where rainfall is adequate. In addition, several temperate fruit crops such as apples, peaches, pears, and strawberries have been introduced and successfully grown in the highland areas of the northern region where the climate is suitable for cultivation. Most of these agricultural products are consumed domestically.

Non-Agricultural (Industrial and Service) Sector

The non-agricultural sector contributed 89.7% of the 2003 GDP but the employment in this sector is only 17.8% more than in the agricultural sector. Thailand's increasingly diversified manufacturing sector made the largest contribution to the economic growth (Figure 1.E) and expanded to various areas throughout the country. Industries registering rapid increases in production included computers and electronics, garments and footwear, furniture, wood products, canned food, toys, plastic products, gems, and jewellery. High-technology products such as integrated circuits and parts, electrical appliances, and vehicles are now making strong growth in exports. The United States of America is Thailand's largest export market and second largest supplier after Japan. While Thailand's traditional major markets have been North America, Japan, and Europe, the economic recovery among Thailand's regional trading partners has helped Thailand's export growth (18.6% in 2003)⁶. Further recovery from the financial crisis depends heavily on increased exports to the rest of Asia and the United States. Thailand is a member of the World Trade Organization (WTO) and the Cairns Group of agricultural exporters. Tourism contributes significantly to the Thai economy (about 4%)⁷, and the industry has benefited from the Thai baht's depreciation and Thailand's stability. Tourist arrivals in 2003 (10.0 million) declined from the previous year (10.8 million)⁶ due to concerns over Severe Acute Respiratory Syndrome (SARS) and the war in Iraq.

⁶ National Economic and Social Development Board.

⁷ Tourism Authority of Thailand

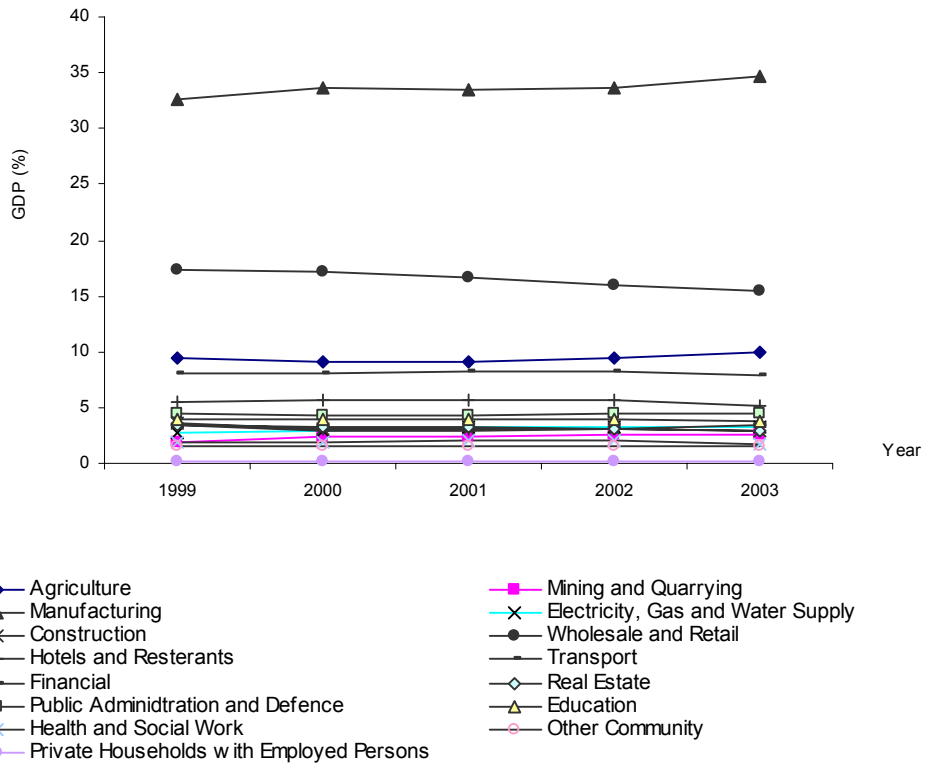


Figure 1.E: Overview of Agricultural and Non-Agricultural (Industrial and Service) Sectors between 1999 and 2003

Table 1.B: Structure of Agricultural Sector (2003)

Farm size (Rais) ^a	National Average (%)	Region (%)			
		North- eastern	Northern	Central	Southern
< 2	4.22	1.61	7.84	9.62	2.20
2 – 9	21.21	20.58	24.18	14.60	25.43
10 – 19	26.59	27.68	23.97	20.94	32.59
20 – 29	17.66	20.42	14.43	11.37	19.40
30 – 39	8.94	9.49	6.93	11.05	8.02
40 – 49	7.26	7.35	6.35	10.42	5.15
50 – 59	5.60	6.37	5.53	4.74	3.92
60 – 69	2.31	2.07	1.52	6.18	0.47
≥ 70	6.22	4.43	9.25	11.08	2.82
Total	100.00	100.00	100.00	100.00	100.00
No. of Agricultural Households	5,642,890	2,786,974	1,248,630	808,251	799,035

Source: Household, Farm Management and Input Research Sector, Ministry of Agriculture and Cooperatives.

^a 1 Rai \approx 0.16 Hectare \approx 0.40 Acre.

Table 1.C: Breakdown of Agricultural Production by Regions (2003)

Region	Major Crops	Total Number of Employees ^a	Size of Productive Areas ^b (Rais) ^c
Central	Rice, Sugar cane, Pineapple, Fruits	3,631,735	21,512,147
Northern	Rice, Fruits, Tobacco, Onion	5,316,436	23,223,277
Northeastern	Rice, Cassava, Kenaf, Maize	14,804,812	51,254,955
Southern	Rubber, Fruits, Coffee, Coconut	3,956,391	15,856,984
Total		27,712,374	111,949,488

^a Source: Household, Farm Management and Input Research Sector, Ministry of Agriculture and Cooperatives

^b Source: National Statistical Office, Ministry of Information and Communication Technology

^c 1 Rai \approx 0.16 Hectare \approx 0.40 Acre.

1.4 Industrial Employment by Economic Sectors

Table 1.D: Structure of Industrial Sector (2003)

Type of Factory	Factories	Employees
Type I: Capability \leq 20 HP ^a or \leq 20 Employees	41,633 (35.23%)	114,317 (3.59%)
Type II: Capability 21 – 50 HP or 21 – 50 Employees	17,296 (14.63%)	182,235 (5.27%)
Type III: Capability $>$ 50 HP or $>$ 50 Employees	59,247 (50.13%)	2,889,936 (90.69%)
Total	118,176 (100.00%)	3,186,488 (100.00%)

Source: Department of Industrial Works, Ministry of Industry.

^a HP = Horse Power.

Table 1.E: Breakdown of Industrial Production by Regions (2003)

Regions	Number of Industrial Facilities	Number of Employees
Bangkok and its vicinity	36,666	1,655,785
Central	12,124	459,454
Eastern	6,864	369,250
Northern	13,228	189,646
Northeastern	38,355	284,842
Southern	10,959	227,511
Total	118,176	3,186,488

Source: Department of Industrial Works, Ministry of Industry

Table 1.F: Industrial Employment by Manufacturing Sectors (2003)

ISIC^a code	Description	Number of Facilities^b
15	Manufacture of food products and beverages	100,143
16	Manufacture of tobacco products	510
17	Manufacture of textiles	58,688
18	Manufacture of wearing apparel, dressing and dyeing of fur	70,527
19	Tanning and dressing of leather; manufacture of luggage, handbags, saddlery, harness, and footwear	4,338
20	Manufacture of wood and of wood and cork products except furniture; manufacture of articles of straw and plaiting materials	44,851
21	Manufacture of paper and paper products	1,604
22	Publishing, printing, and reproduction of recorded media	4,799
23	Manufacture of coke, refined petroleum products, and nuclear fuel	90
24	Manufacture of chemicals and chemical products	2,241
25	Manufacture of rubber and plastic products	3,917
26	Manufacture of other non-metallic mineral products	9,650
27	Manufacture of basic metals	1,729
28	Manufacture of fabricated metal products, except machinery and equipment	25,549
29	Manufacture of machinery and equipment (n.e.c. ^c)	4,804
30	Manufacture of office, accounting, and computing machinery	31
31	Manufacture of electrical machinery and apparatus (n.e.c.)	1,092
32	Manufacture of radio, television, and communication equipment and apparatus	670
33	Manufacture of medical, precision, and optical instruments and watches and clocks	340
34	Manufacture of motor vehicles, trailers, and semi-trailers	1,153
35	Manufacture of other transport equipment	710
36	Manufacture of furniture; manufacturing (n.e.c.)	22,038
37	Recycling	112
Total		359,616

^a ISIC: International Standard Industrial Classification of all Economic Activities.

^b Source: National Statistical Office, Ministry of Information and Communication Technology.

^c n.e.c: no explanatory note available for this code.

CHAPTER II

CHEMICAL PRODUCTION, IMPORT, EXPORT AND USE

Chemicals are important raw materials because chemical substances are involved in every production not only for agricultural and industrial but also for consumers sectors. Thailand imports most primary chemicals for producing products that relate to upstream and downstream industries, which increases the value added to products.

All chemical sectors in Thailand including manufacture, exportation, importation and consumer use make a significant contribution to the domestic economy. Chemical substances in Thailand are used for a wide range of purposes, from those bought over the counter for personal care, to medical uses and cleaning, through to agricultural and industrial chemicals.

Although chemical substances are tremendously useful, their application without due care, appropriate maintenance, and effective protection can bring about disastrous consequences. Thailand has realized health and environmental problems posed by chemicals and wastes. With regard to waste management, there are many agencies involved. All of them have their own information and data collecting strategy. Their recording systems are not harmonized, hence, there are some overlaps and gaps in waste information. In order for better chemical waste management scheme, greater attentions should be placed on the search and analysis of available waste information.

This chapter provides cradle-to-grave information of chemical substances. Part 1 shows statistics regarding import, export and production of chemical substances, categorized into 6 chemical types; pesticides, fertilizers, petroleum products, petrochemical products, industrial chemicals, and consumer chemicals. Second part gives detailed importation statistics of agricultural chemicals. Third part reviews the use of chemical substances for controlling malaria and dengue. The last part provides available information of waste generation in Thailand.

2.1 Chemical Production, Import and Export

Table 2.A: Chemical Production and Trade in 2003

Chemical Type	Production/ Manufacturing	Imports		Exports	
		Amount	Value (million B)	Amount	Value (million B)
Pesticides ^a (K ton) (for agricultural, consumer and other sectors)	N/A	73.0	10,035.8	10.4	1,952.2
Fertilizers ^a (K ton)	N/A	4,709.7	26,745.6	108.3	809.8
Petroleum products ^b					
- Crude Oil (ML)	5,590.0	45,025.0		-	
- Diesel (ML)	19,176.8	605.3		2,148.2	
- Gasoline (ML)	8,639.7	139.3		1,108.3	
Petrochemical Product ^c (K ton)					
- PE	1,307.0	188.2	6,246.8	632.9	17,036.8
- PVC	677.0	51.0	1,724.1	348.1	9,265.3
- PP	1,080.0	126.0	4,819.8	482.9	14,459.5
- PS + EPS	396.0	56.3	2,743.0	211.7	7,071.0
- ABS + SAN	243.0	71.1	4,087.2	119.3	5,307.9
- PET	1,039.0	24.9	1,08.7	215.4	7,272.4
Industrial chemicals ^a (K ton) (used in manufacturing / processing facilities)	N/A	5,221.1	183,130.0	3,077.4	73,140.5
Consumer Chemicals ^a (K ton) :					
1. Pharmaceutical products (for human use only)	N/A	20.2	17,147.9	16.8	3,320.8
2. Cosmetics, perfumery, toilet preparations and detergents	N/A	24.7	7,474.0	156.8	17,521.0
3. Disinfectants	N/A	3.2	451.0	0.9	105.7

Source: ^a Ministry of Commerce, ^b Energy Policy and Planning Office, ^c Office of Industrial Economic

ML = million litre, K ton = Kilo ton; (x1000 ton)

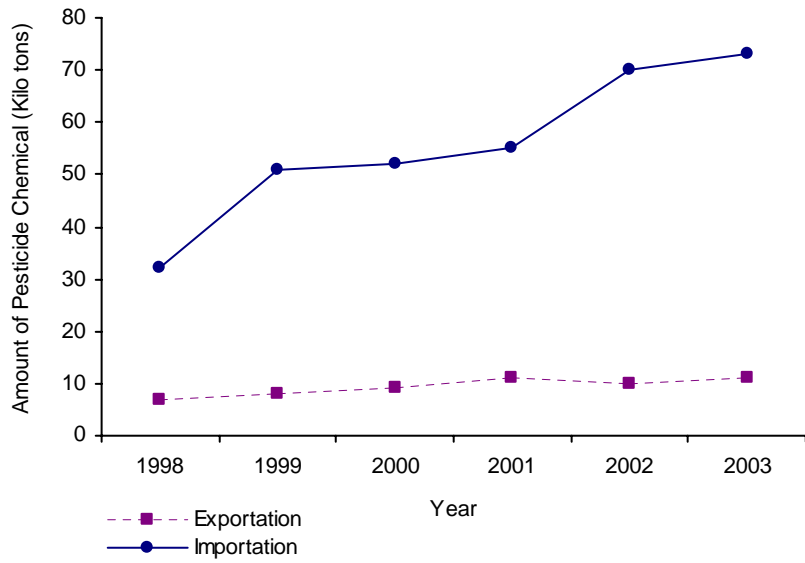


Figure 2.A: Amount of Pesticide Trade during 1998 – 2003
 Source: Ministry of Commerce

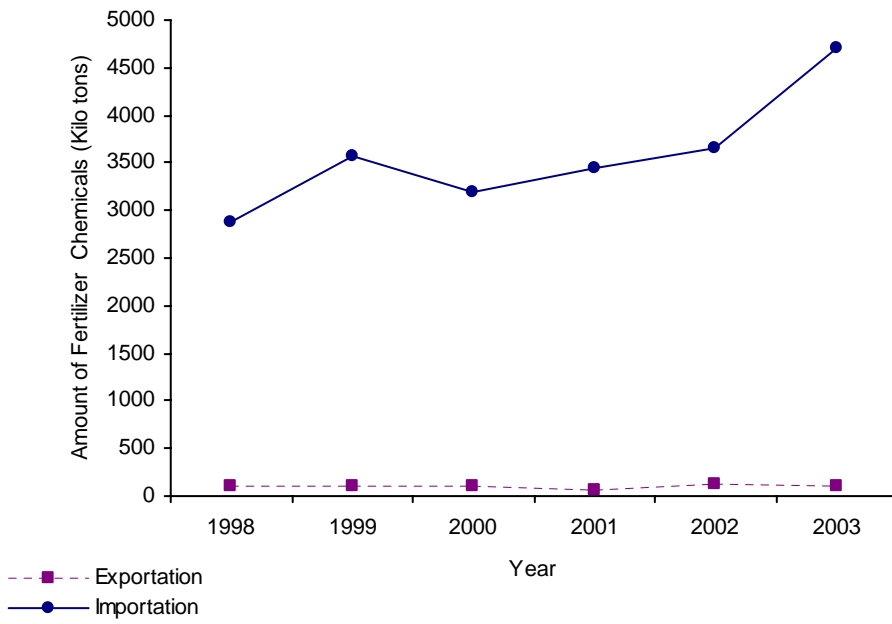


Figure 2.B: Amount of Fertilizer Trade during 1998 – 2003
 Source: Ministry of Commerce

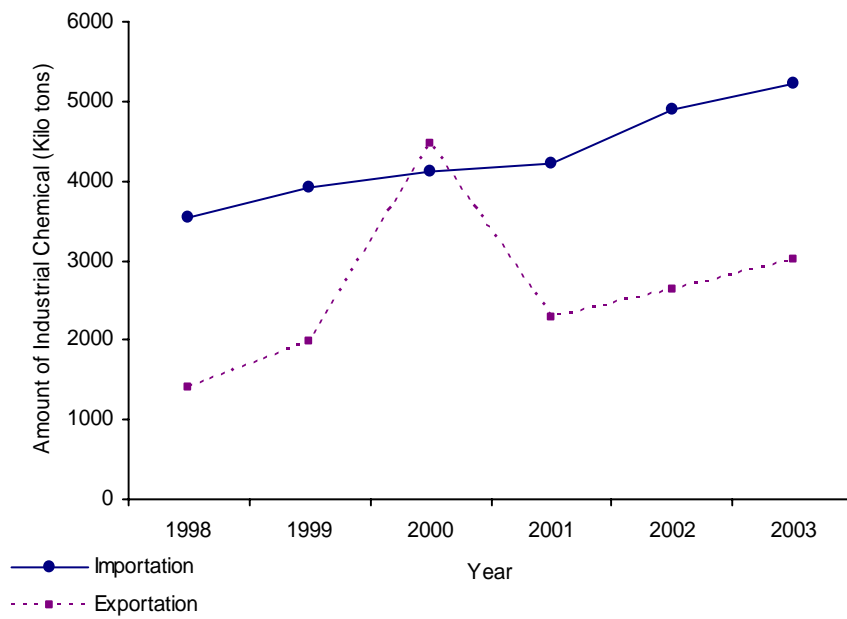


Figure 2.C: Amount of Industrial Chemical Trade during 1998 – 2003

Source: Ministry of Commerce

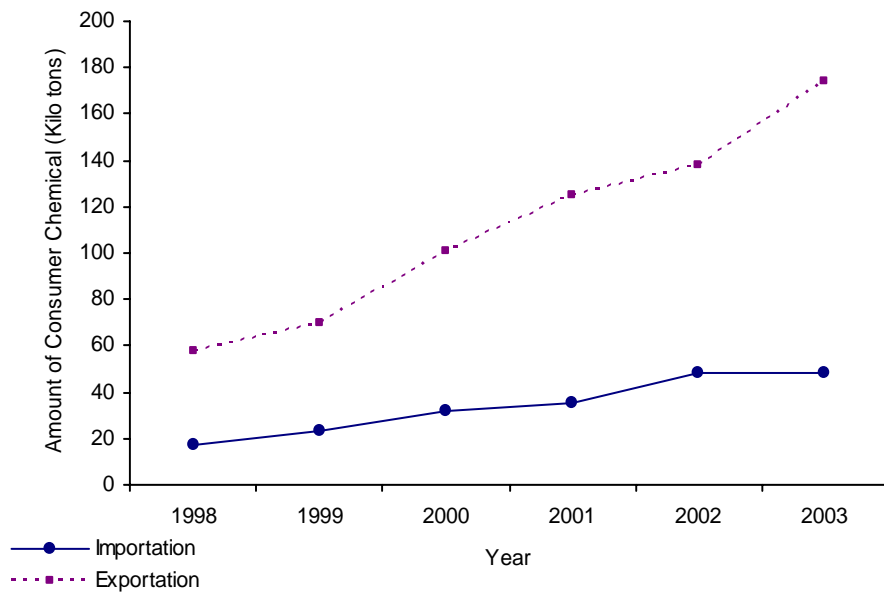


Figure 2.D: Amount of Consumer Chemical Trade during 1998 – 2003

Source: Ministry of Commerce

Table 2.B: Importation of Hazardous Substances for Agriculture by Categories in 2003

Type	Amount (tons)	Active Ingredient (tons)	Value (Million B)
Chemical Agents			
Insecticide	14,994.1	9,790.2	3,135.8
Fungicide	10,326.4	6,731.7	1,678.1
Herbicide	50,463.9	31,878.6	6,101.0
Other pesticides including plant growth regulators (PGRs)	3,794.0	1,930.6	426.4
Biological Agents			
Bio-Pesticide	126.6	126.6	38.7
Others			
Methyl Chloride For producing paraquat only	132.5	129.8	5,812.2

Source: Office of Agricultural Regulation, Department of Agriculture, Ministry of Agriculture and Co-operatives

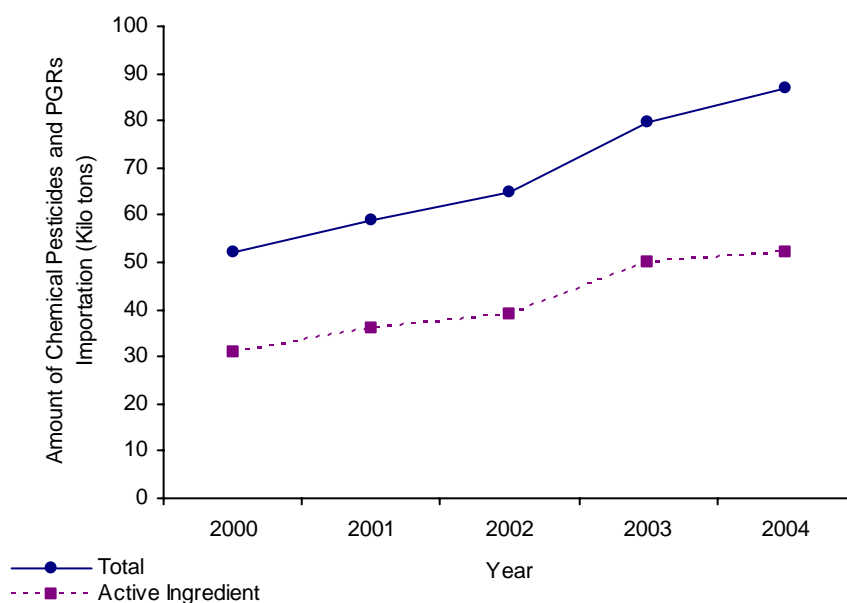


Figure 2.E: Amount of Chemical Pesticides and Plant Growth Regulators Importation during 2000 – 2004

Source: Office of Agricultural Regulation, Department of Agriculture, Ministry of Agriculture and Co-operatives

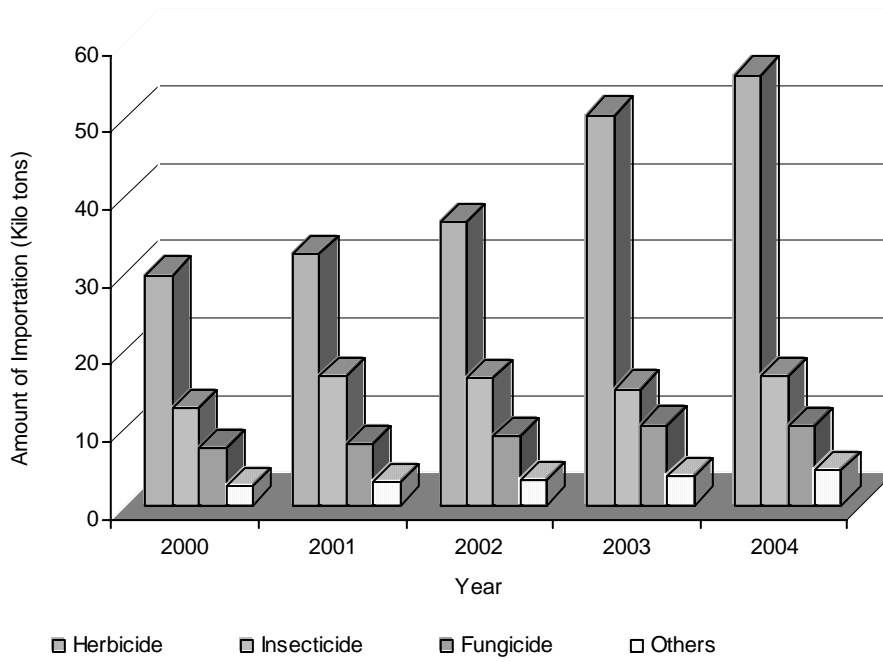


Figure 2.F: Amount of Chemical Pesticides and Plant Growth Regulators Importation by Categories during 2000 – 2004

Source: Office of Agricultural Regulation, Department of Agriculture, Ministry of Agricultural and Co-operatives

2.3 Chemical Waste

Table 2.D: Chemical Waste Generation in 2003

Type of Waste	Generation (ton)
1. Industrial hazardous waste #	1,234,694.0
2. Industrial non-hazardous waste #	6,128,360.0
3. Infectious waste in Bangkok area	5,212.0
4. Domestic waste #	14,322,600.0
5. Domestic waste collected in Bangkok Area	2,775,607.0
6. Radioactive waste in solid form	8.4
7. Radioactive waste in liquid form (m ³)	310.5

Source: 1 & 2 - Department of Industrial Works, Ministry of Industry
 3 - Department of Health, Ministry of Public Health
 4 - Pollution Control Department, Ministry of Natural Resources and Environment
 5 - Department of Public Cleansing, Bangkok Metropolitan Administration
 6 & 7 - Office of Atoms for Peace, Ministry of Science and Technology

Estimated value of waste generation

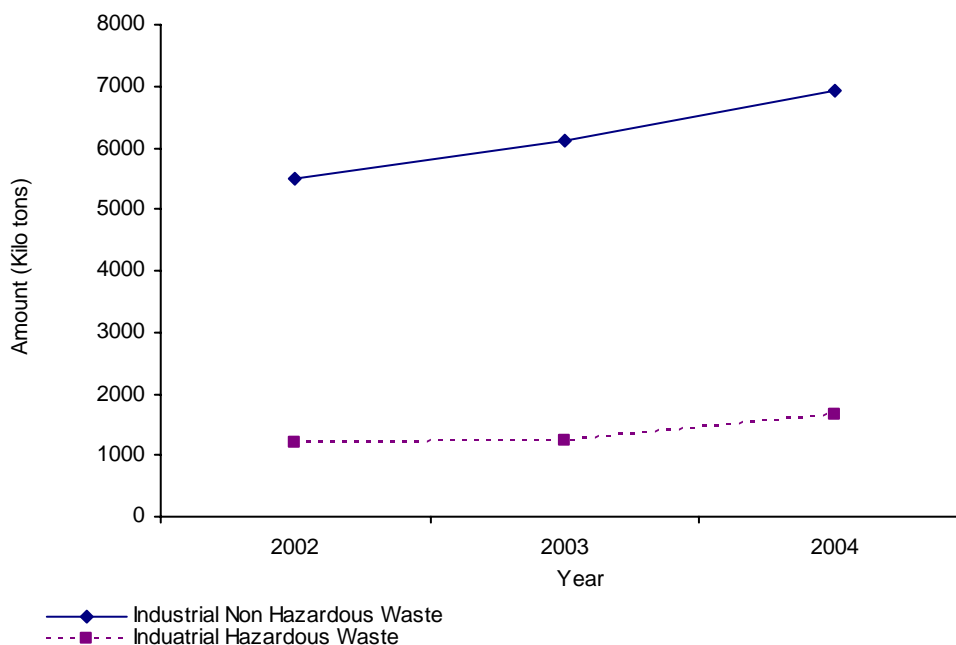


Figure 2.G: Amount of Industrial Waste during 2002 – 2004

Source: Department of Industrial Works, Ministry of Industry

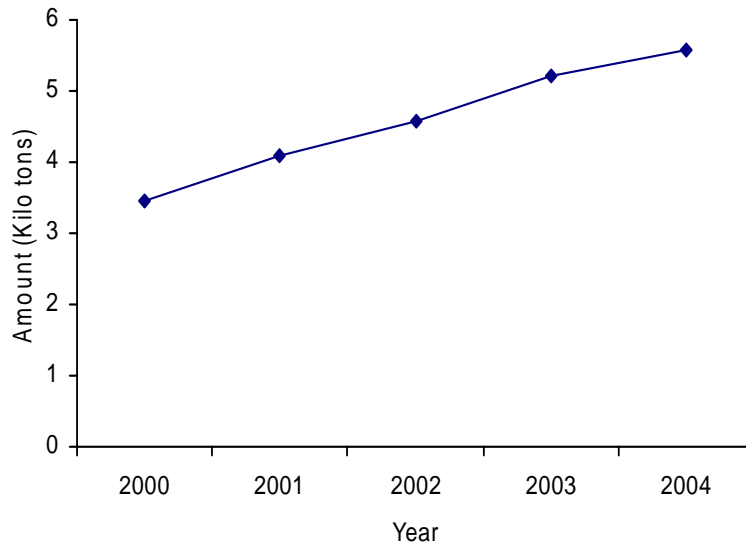


Figure 2.H: Amount of Infectious Waste Collected in Hospitals in Bangkok Metropolis during 2000 – 2004

Source: Department of Health, Ministry of Public Health

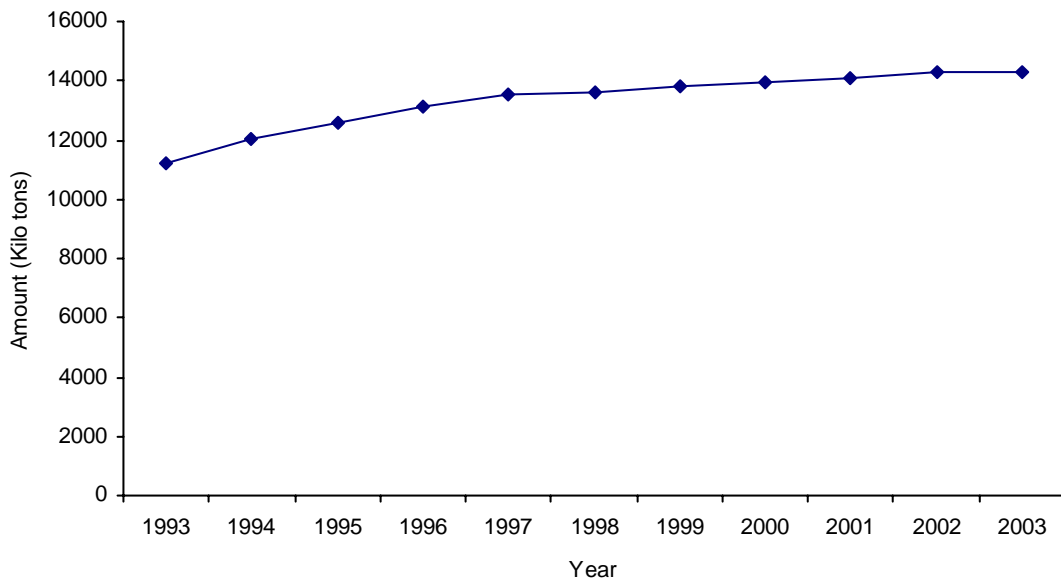


Figure 2.I: Amount of Domestic Waste Generated in Thailand during 1993 – 2003 #

Source: Pollution Control Department, Ministry of Natural Resources and Environment

Estimated value of waste generation

2.4 Comments and Analysis

The rapid economic growth and modern technology have extended the use of chemicals and the amount used has increased in both occupational and household settings. In Thailand, chemical substances are imported mainly for industrial and agricultural use. In 2003, about 5,200,000 tons (183,130 million Baht in value) of industrial chemicals were

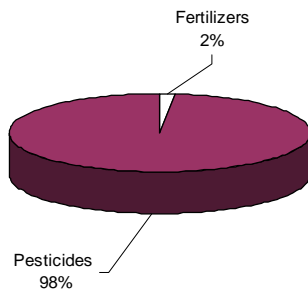


imported for manufacturing, whereas the export quantity was 3,077,000 tons (73,140 million Baht), as shown in Table 2.A. With regard to agricultural chemicals, Thailand imported approximately 73,000 and 4,700,000 tons of pesticides and fertilizers, respectively. The exportation of pesticides and fertilizers was about 10,000 and 108,000 tons, which is far smaller than the importation. This

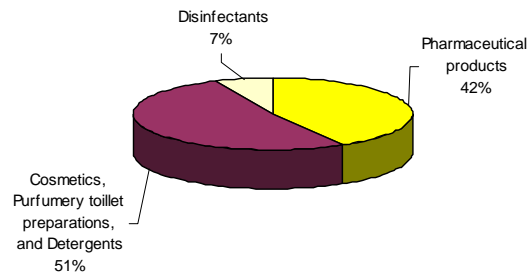
implies strong domestic consumption of pesticides and fertilizers. Table 2.B and Figure 2.F indicate that the largest and fastest growing agricultural chemical importation is for herbicides. For agricultural sector, pesticides and fertilizers are imported as active ingredients for domestic formulation; imported formulations for local packaging; and imported finished products.

Petroleum chemical products including diesel, gasoline and crude oil are very much of concern, being necessary for driving national economy. They are consumed not only in production sector but also in service sector, such as transportation. Thailand does not have her own crude oil and therefore imports most of petroleum products for use in the country. Crude oil is imported and further distilled to diesel or gasoline and other petroleum products. In 2003, an amount of 45,025 million litres of crude oil was imported (Table 2.A). Most of domestic demand of petroleum products is served by local refineries. Only a small portion of the refined petroleum is exported -- 3,000 million litres of diesel and gasoline products exported in 2003.

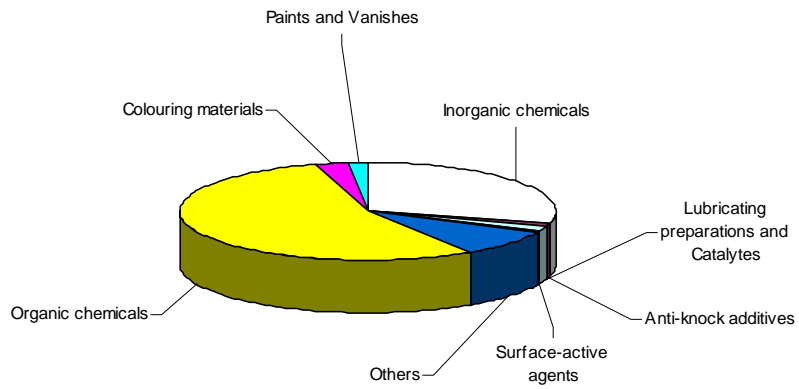
The amount of imported chemicals and related products in 2003 for industrial, agricultural and consumer sectors can be categorized as shown in Figure 2.J.



a) Agricultural chemicals products



b) Consumer products



c) Industrial Chemicals

Figure 2.J Amount of imported chemicals and related products categorized by utility in 2003

It is noted that data collecting systems of importation in Thailand are not harmonized. The primary source of the importation data is the Customs Department. Other governmental agencies have their own systems of analyzing import statistics to serve specific functions. Hence, there is a need to harmonize the existing systems and this should be conducted in accordance with the forthcoming government development of logistics for overall national management.

For disease vectors control, chemical substances are still commonly used specifically for controlling malaria and dengue. Deltamethrin, permethrin and temephos are used for malaria control; a record of 39,117 and 24,061 kilograms of deltamethrin and permethrin, respectively in 2002. Temephos of about 407,618 kilograms was also used for dengue control. Although DDT is generally banned for other use by Hazardous Substance Act 1992, the Department of Disease Control utilized DDT for vector control until 2001. In recent years, new epidemic diseases, such as severe acute respiratory syndrome (SARS) and avian influenza (bird flu) emerged periodically; thus requiring great attention in epidemic control and prevention.

The amount of chemical substances importation increases in the past years because of the continuing economic growth. Accompanying the increase of importation quantity of chemical substances is the increase of waste generation. Over 14 million tons of domestic waste was reported for 2003. It is estimated that over 1 million tons of hazardous waste was generated from industrial sources and special facilities for handling these wastes are still inadequate. There are neither well-established systems for separation, storage, collection, and transportation, nor effective enforcement of regulations related to hazardous wastes management generated from industrial or non-industrial sectors. Therefore, due to the lack of treatment and disposal facilities, these wastes find their way into municipal wastewaters, public landfills, nearby dump sites or waterways; raising serious environmental concerns. Infectious waste is a small fraction of urban municipal waste but it can seriously affect when lacking of good management. During 2003, about 5 kilotons of infectious waste was produced, collected and treated in Bangkok area.

CHAPTER III

Priority Concerns Related to Chemical Production, Import, Export and Use

Chemicals constitute a vital part of our daily life. They provide society with a wide range of benefits, particularly for the increase of agricultural and industrial productivity and improvement in the control of disease. On the other hand, chemicals have the potential to cause considerable health and environmental problems throughout their life cycle, from production to disposal. In Thailand, the priority concerns during chemical production, import, export and use are given to solve public problems and to ensure a living environment for safety and better quality of life. The Thai Government has promulgated various laws, regulations, standards and policies to strengthen management over the production, transportation, storage, marketing, use, import and export of chemicals (see Chapter 4). Environmental protection agencies and medical, health and epidemic-prevention bodies at various levels exercise their supervision and monitoring of chemicals, as well as make appraisals, tackle pollution problems, and prevent and solve health problems. Table 3.A reviews problems in the fields of health and environment and reports the current status of management. Table 3.B provides additional information on prioritization of the potential problems identified in Table 3.A.



3.1 Priority Concerns Related to Chemical Production, Import, Export and Use

Table 3.A: Description of Problem Areas

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s) / Pollutant(s)
Air Pollution	National	<p>Air pollution is originated primarily from vehicles, construction sites, and industrial plants. Vehicles and construction activities are the major sources in large urban centres (Bangkok, and Chiang Mai provinces), while industrial air pollution is site-specific problem in both urban and rural areas.</p> <p>The industrial air pollution leads to acute and chronic health effects, and also causes nuisance problems from releases of specific odours.</p>	<ul style="list-style-type: none"> ▪ Particulate matter having the size not more than 10 micron (PM₁₀) ▪ Ozone ▪ Total Suspended Particulate Matter (TSP) ▪ Volatile organic compounds (VOCs)
	Bangkok	<p>It was reported by the Pollution Control Department during 1999 - 2003 that the curbside air quality in many areas of Bangkok was a serious problem, particularly with particulate matter having the size not more than 10 micron (PM₁₀). Ozone was found in higher concentration than the standard levels at the residential and commercial areas as compared to the areas adjacent to major roads. For carbon monoxide and nitrogen dioxide, the concentrations were intermittently higher than the standard levels.</p>	<ul style="list-style-type: none"> ▪ PM₁₀ ▪ Ozone
	Samut Prakarn and Saraburi Provinces	<p>During 1999 - 2003, PM₁₀ was a major environmental problem. It was found in higher concentration than the standard level in Samut Prakarn and Saraburi Provinces, resulting from located manufacturing factories and cement plants, respectively. Ozone has been occasionally found in higher concentration than the standard level.</p>	<ul style="list-style-type: none"> ▪ PM₁₀ ▪ Ozone

Table 3.A: Description of Problem Areas (continued)

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s) / Pollutant(s)
Soil Contamination	National	<p>Soil is generally contaminated with chemicals derived from the application of herbicides and pesticides in agriculture in some areas of central, northern and eastern. Besides, heavy metals from industrial operations to some extent pollute the soil.</p> <p>Heavy metal contamination are found in several areas as follows: <i>Lead:</i> in some areas of Kanjanaburi Province in the western region and in some areas of the central region <i>Cadmium:</i> in some areas of Tak Province in the northern region <i>Arsenic:</i> in some areas of Nakon srithammarat Province in the southern region <i>Nickel:</i> in some areas of the central region <i>Chromium:</i> in some areas of the central region <i>Mercury:</i> in the terrestrial soil in areas close to the Gulf of Thailand, resulting from leakage of natural gas from petrochemical industry.</p>	<ul style="list-style-type: none"> ▪ <i>Insecticides:</i> organophosphates, carbamates and organochlorines ▪ <i>Herbicides:</i> paraquat and glyphosate ▪ <i>Heavy metals:</i> lead, cadmium, arsenic, mercury, nickel and chromium
Pollution of Inland Waterways	National	<p>The main rivers of Thailand are Chao Praya, Ta Chin and Bang Pakong in the central region; Lum Takong in the north-eastern region; and Song Khla lake in the southern region. The quality of surface water of these rivers appears to decline and is contaminated with fecal coliform. High levels of BOD but low DO levels are consequences of the expansion of industrialization, agricultural activities and community growth. Effluent released from these sources is not always treated properly. Several rivers, especially in the northern region, show high turbidity due to soil erosion and agricultural activities in elevated areas.</p>	<ul style="list-style-type: none"> ▪ Fecal coliform bacteria (FCB)
Marine Pollution	Tourist and industrial areas	<p>The water quality in coastal areas is in good condition except in the tourist and industrial areas. Major contributor of water pollution is the waste water discharged from communities, factories, aquaculture farms, ranches and agricultural lands contaminated with organic matters, fertilizers, pesticides and antibiotics. Direct waste water discharge and transport of pollutants along the rivers accelerate the result of poor water quality. Furthermore, these pollutants are bioaccumulation and biomagnifications.</p>	<ul style="list-style-type: none"> ▪ FCB ▪ Heavy metals such as mercury, lead, cadmium, chromium, copper, nickel, manganese, zinc and fluorine

Table 3.A: Description of Problem Areas (continued)

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)
Ground Water Contamination	Western, northern, and southern regions	<p>Different contaminants have been found in natural water and generally related to soil conatmination, as follows: <i>Fluoride</i>: rivers and groundwater are contaminated with fluoride in some areas of the northern region. <i>Lead</i>: contamination found in Kanjanaburi Province in the western region. <i>Cadmium</i>: contamination found in some areas of Tak Province in the northern region. <i>Arsenic</i>: contamination in some areas of Nakhonsrithammarat Province in the south.</p> <p>Bureau of Epidemiology (BE) / Department of Disease Control (DDC) and Department of Mineral Resources reported recent information regarding to arsenic contamination in the natural groundwater indicating that there are arsenic ore lines going through 25 provinces: Saraburi, Supanburi, Rayong, Sakaew, Rachaburi, Kanjanaburi, Prachubkirikan, Loei, Nongbualampoo, Nongkai, Tak, Petchaboon, Nan, Utaradit, Chiang Mai, Chiangrai, Maehongson, Lampang, Lamphun, Trang, Yala, Songkla, Patalung, Satul and Nakhon Srithammarat. It is therefore likely that groundwater adjacent to arsenic ores will be contaminated.</p>	<ul style="list-style-type: none"> ▪ Lead, cadmium, arsenic and fluorides.
Occupational Health: Agriculture	National	<p>BE / DDC reported that the number of pesticide poisoning patients in 2003 was 2,349: 56.02% from the north, 27.67% from the northeast, 14.47% from the central region and 1.84% from the south. The top ten provinces where pesticide poisoning admissions were reported are: Nakhonsawan, Petchaboon, Nakhonratchasima, Kampangetch, Uthaitani, Pichit, Pitsanulok, Sukothai, Udonthani, and Srisaket, respectively.</p> <p>Statistics collected by the Epidemiological Surveillance System 506 show that in 2003 pesticide poisoning is the foremost cause of occupational health problems in the agricultural sector. It is a considerably more severe problem than that of poisoning by industrial chemicals (Figure 3.A). Whilst the number of both pesticide poisoning cases and deaths decreased between 1998 and 2003 (Figure 3.B), the current cases continue to be above 2000 per year.</p>	<ul style="list-style-type: none"> ▪ <i>Insecticides</i>: organophosphates, carbamates, and organochlorines ▪ <i>Herbicides</i>: paraquat and glyphosate

Table 3.A: Description of Problem Areas (continued)

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)
Occupational Health: Agriculture (continued)	National	According to the Bureau of Occupational and Environmental Disease (BOED) / DDC, the nation-wide screening of people in agricultural sector, using the reactive paper test showed that the percentage of population at risk of organophosphates and carbamates (having cholinesterase in blood lower than 75.0 unit/ml) increased continuously from 15.96% in 1997 to 29.14% in 2002 (Figure 3.C). With the morbidity and death rates due to pesticide poisoning during 1997- 2003 in the range of 0.34-1.03%, the result of blood screening test suggests that high exposure to pesticides be of concern, although the health effect severity is not up to acute poisoning case or death.	

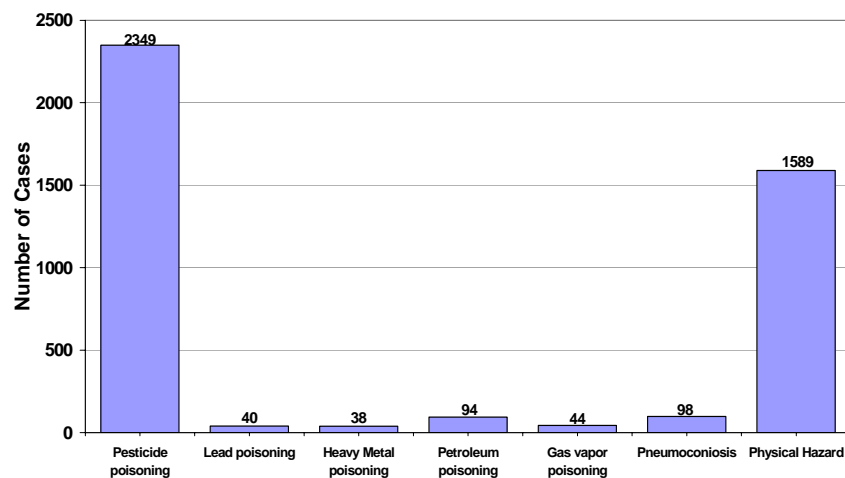


Figure 3.A: Occupational Disease in Thailand in 2003

Source: BE/DCC

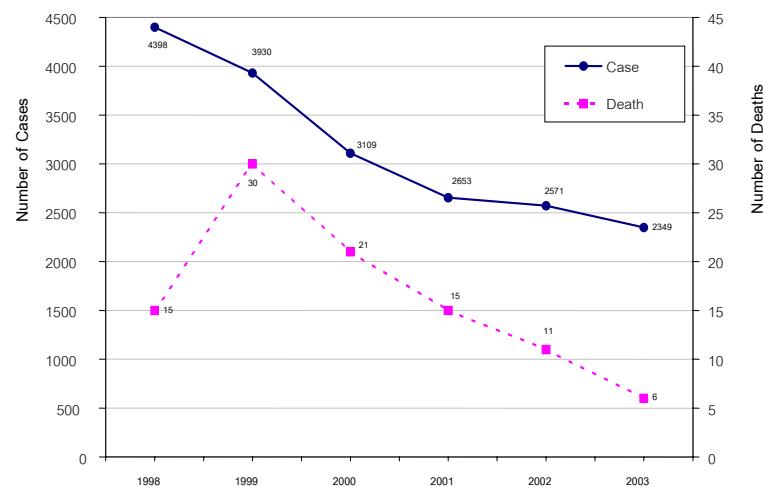


Figure 3.B: Pesticide poisoning in Thailand during 1998 – 2003

Source: BE/DCC

Table 3.A: Description of Problem Areas (continued)

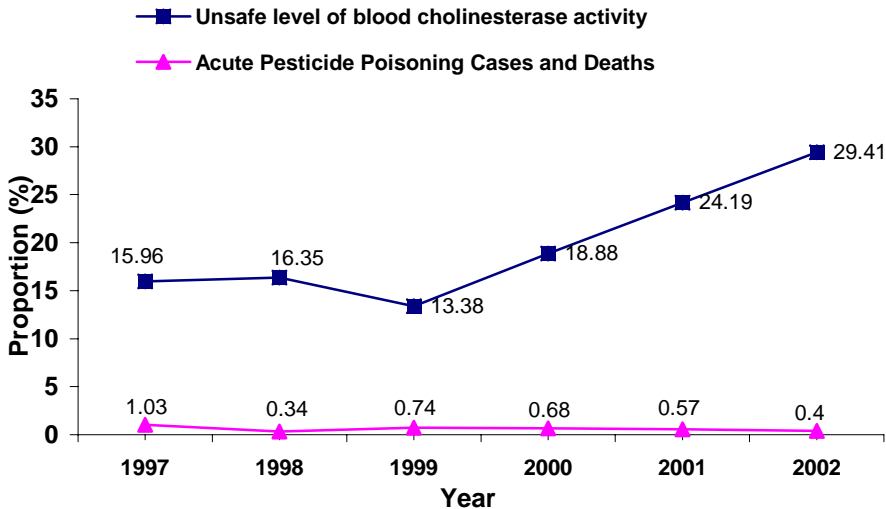
Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)
Occupational Health: Agriculture (continued)		 <p data-bbox="831 917 1534 1007">Figure 3.C: Proportion of agriculturers having unsafe blood chlorinesterase level and epidemiological statistics of acute poisoning cases and deaths during 1997 - 2002</p> <p data-bbox="1041 1029 1236 1054">Source: BOED/DDC</p>	
Occupational Health: Industrial	National	<p data-bbox="656 1126 1686 1273">The Bureau of Epidemiology reported that between 1998 and 2003, the top five occupational health problems were pneumoconiosis, petroleum poisoning, lead poisoning, gas vapour poisoning and heavy metal poisoning (Figure 3.D). The very high number of gas vapour poisoning cases in 2000 was due to the leakage of phosgene and ammonia.</p>	<ul data-bbox="1709 1126 1973 1273" style="list-style-type: none"> ▪ Silica ▪ Asbestos ▪ Organic solvents ▪ Pesticides ▪ Chemical fertilizers

Table 3.A: Description of Problem Areas (continued)

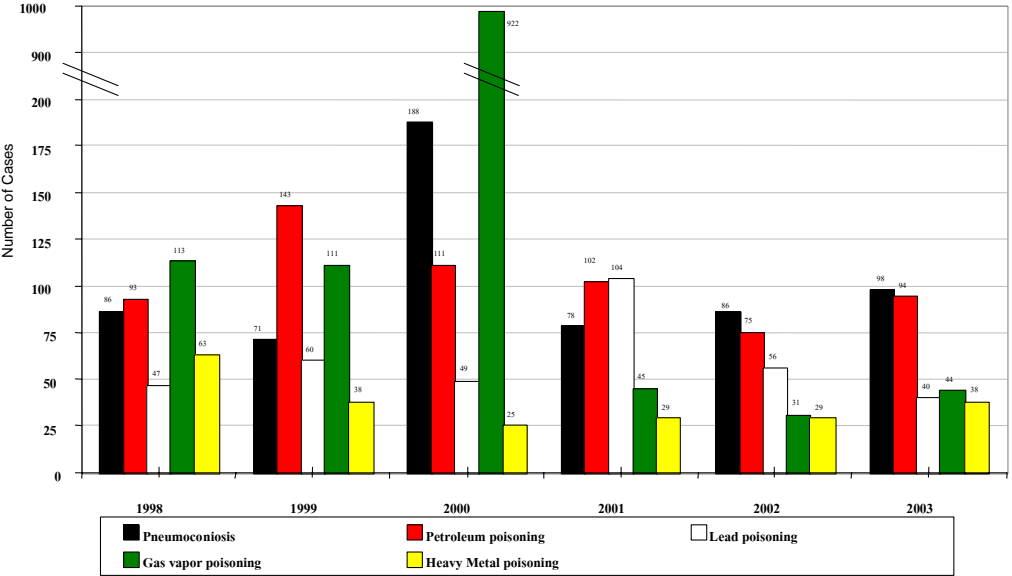
Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)
Occupational Health: Industrial (continued)		 <p data-bbox="772 962 1339 979">Figure 3.D : Occupational health problems in industrial sector during 1998 - 2003</p> <p data-bbox="1019 995 1182 1018">Source: BE/DDC</p> <p data-bbox="656 1066 1686 1249">The Bureau of Occupational and Environmental Diseases has continuously conducted health surveillance program for 6 important chemicals (lead poisoning, silicosis, asbestosis, organic solvents poisoning, pesticides poisoning and arsenic poisoning). The high-risk areas of occupational diseases caused by industrial chemicals are Chonburi, Rayong, Chacheangsao, Samut Prakan, Bangkok and regional centre provinces (Chiang Mai, Songkhla, Khon Kaen).</p>	<ul style="list-style-type: none"> ▪ Heavy metals: lead, arsenic, cadmium, mercury, nickel manganese, and chromium ▪ Gas: ammonia ▪ POPs ▪ Organic solvents

Table 3.A: Description of Problem Areas (continued)

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)
Occupational Health : Service Workplace	National	Sick building syndrome caused by indoor air pollution in service workplaces such as hotels, apartments, and hospitals.	<ul style="list-style-type: none"> ▪ Smoke ▪ TSP ▪ PM₁₀ ▪ Gas ▪ Organic solvents ▪ Liquid nitrogen, ethylene oxide and oxygen ▪ Alcohol, formaldehyde, and glutaraldehyde
Occupational Health: Local SMEs	Rural areas, and handicraft centers in all regions	Occupational health concerns in SMEs are workers exposed to chemicals used for painting, gluing, degreasing, and extraction.	<ul style="list-style-type: none"> ▪ Organic solvents: benzene, toluene, trichloroethylene, ethyl alcohol, methyl alcohol, acetone, chloroform, etc. ▪ TSP ▪ PM₁₀
Drinking Water Contamination	Bangkok Northern, western and southern regions	<p>A study conducted by the Department of Medical Sciences in 2003 showed that endosulfan contamination in water samples collected from the Chao Phaya River and tap water in Bangkok Metropolitan area was in the range of 0.02-0.11 and 0.01-0.15 micrograms/litre, respectively. Endosulfan contamination in tap water in Bangkok was associated with that in water of the Chao Phaya River. A subsequent study in 2004 indicated that endosulfan contamination in tap water was below 0.01-0.06 micrograms/litre, and the problem was more frequently found in tap water in Bangkok than that in other provinces. However, the overall risk assessment indicated that the estimated human exposure to endosulfan through drinking tap water was far lower than the WHO Acceptable Daily Intake (ADI) value.</p> <p>Drinking water contamination is associated with ground and stream water, which is locally, tainted with lead (Kanjaburi Province), cadmium (Tak Province), and arsenic (Nakon Srithammarat Province).</p>	<ul style="list-style-type: none"> ▪ Endosulfan ▪ Lead, cadmium and arsenic

Table 3.A: Description of Problem Areas (continued)

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)
Chemical Residues in Foods	National	<p>Monitoring of chemical contamination in foods sold in Thailand has been routinely conducted by the Ministry of Public Health. The nation-wide screening program of chemical residues in foodstuffs has shown that, during 2000-2003, the misuse of formalin and borax in seafood, poultry and meat products, decreased due to active monitoring and public education. However, the problem of pesticide residues in vegetables and fruits is still of concern. The screening indicates that during 2000-2003, 2-8% of sampled vegetables and fruits contained pesticide residues over the safety limit. In animal products, the problem of pesticide residues, particularly in dried /salted fish, a typical Thai food, is still of concern and under monitoring.</p> <p>A study conducted by FDA, using comprehensive laboratory tests, revealed that during 2000 - 2003, 56-70% of vegetables were contaminated with pesticides and 11-17% of samples had pesticide residues over Maximum Residue Limits (MRLs). Moreover, the study showed that vegetables commercially claimed as pesticide-free, were still contaminated with pesticides, some containing residues over MRLs. However, the problem is less pronounced than that in ordinary vegetables.</p> <p>The problem of veterinary drug residues in animal products, both for domestic consumption and exportation, has been in attention of the Government since 1995. Drugs severely restricted for importation include clenbuteral (1995), and salbutamol (2002), which were abused in pig farming. Since 2002, 16 pharmaceutical chemicals, including chloramphenicol and nitrofurans, have been strongly restricted for importation in order to obstruct the abuse in animal farming in response to the complaints of importing countries regarding the residues found in poultry and shrimp.</p>	<ul style="list-style-type: none"> ▪ Pesticides ▪ Chemicals: formalin, borax, and colouring chemicals not allowed in foods ▪ Veterinary drugs: clenbuteral, salbutamol, chloramphenicol, and nitrofurans
Banned chemical residues in traditional medicines	National	<p>The nation-wide screening by FDA revealed that during 2000-2003, 2-9% of sampled traditional medicines contained steroids.</p> <p>Ministry of Public Health reported that, in 2001, some traditional medicines were contaminated with arsenic in the amounts larger than the safety limit of 4 ppm, since the manufacturers used banned red arsenic (As₄S₄) instead of rare natural red colorant.</p>	<ul style="list-style-type: none"> ▪ Steroids ▪ Arsenic

Table 3.A: Description of Problem Areas (continued)

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)
Banned chemicals in cosmetics	National	According to the national-wide monitoring programme by Ministry of Public Health, certain cosmetic products, such as skin-bleaching cream, acne cream, and sun screening products, are adulterated with some banned chemicals.	<ul style="list-style-type: none"> ▪ Mercury ▪ Ammoniated mercury ▪ Hydroquinone ▪ Vitamin A acid ▪ Some colouring agents
Chemical poisoning / suicide	National	<p>Statistics collected by the Bureau of Epidemiology/ DDC, during 1997-2003, indicated that suicidal attempts using toxic substances resulted in hospitalization of about 5677 cases per year (± 667), and in mortality of about 261 deaths per year (± 59).</p> <p>A preliminary research (2004) funded by TRF according to 580 poisoning cases in 6 major provincial hospitals revealed that the chemicals used for committing suicide include medicines (36.8%), pesticides for agricultural use (25.5%), pesticides for household use (8.7%), and cleansing products (27.5%). The report also indicated that only 8% of suicidal attempt cases resulted in death, and most of the death cases utilized agricultural chemicals in high concentrations.</p>	<ul style="list-style-type: none"> ▪ Medicines ▪ Pesticides ▪ Cleansing products
Adverse reactions of health and consumer products	National	According to adverse drug reactions (ADRs) monitoring program of FDA, the number of reports from healthcare professionals from all over the country has increased over the years (Figure 3.E). The analysis of 2004 (Figure 3.F) indicated that systemic anti-infective drugs were the principal cause, contributing 57% of all reported cases. The drug group for musculoskeletal system, similar to the drug group for central nervous system, was associated with 13% of reported ADRs. The drug groups for cardiovascular system, alimentary tract & metabolism, and respiratory system attributed to 3 - 4% of cases reported.	<ul style="list-style-type: none"> ▪ Medicinal drugs ▪ Other consumer products, such as household hazardous products, cosmetics and etc.

Table 3.A: Description of Problem Areas (continued)

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)																																																																
		<div data-bbox="672 343 1545 774"> <table border="1"> <caption>Data for Figure 3.E: Adverse Drug Reaction (ADR) Reports (1983-2004)</caption> <thead> <tr> <th>Year</th> <th># of ADR reports</th> </tr> </thead> <tbody> <tr><td>1983</td><td>176</td></tr> <tr><td>1984</td><td>234</td></tr> <tr><td>1985</td><td>295</td></tr> <tr><td>1986</td><td>243</td></tr> <tr><td>1987</td><td>330</td></tr> <tr><td>1988</td><td>658</td></tr> <tr><td>1989</td><td>663</td></tr> <tr><td>1990</td><td>743</td></tr> <tr><td>1991</td><td>963</td></tr> <tr><td>1992</td><td>1,250</td></tr> <tr><td>1993</td><td>2,303</td></tr> <tr><td>1994</td><td>3,360</td></tr> <tr><td>1995</td><td>3,901</td></tr> <tr><td>1996</td><td>4,352</td></tr> <tr><td>1997</td><td>4,344</td></tr> <tr><td>1998</td><td>6,380</td></tr> <tr><td>1999</td><td>9,649</td></tr> <tr><td>2000</td><td>9,119</td></tr> <tr><td>2001</td><td>14,000</td></tr> <tr><td>2002</td><td>17,730</td></tr> <tr><td>2003</td><td>18,405</td></tr> <tr><td>2004</td><td>12,400</td></tr> </tbody> </table> </div> <p data-bbox="784 790 1478 821">Figure 3.E: Statistic of adverse drug reactions (ADRs) reported during 1983 – 2004</p> <p data-bbox="1075 837 1209 869">Source: FDA</p> <div data-bbox="694 877 1668 1228"> <table border="1"> <caption>Data for Figure 3.F: ADRs caused by different drug groups in 2004</caption> <thead> <tr> <th>Drug Group</th> <th>Percentage</th> </tr> </thead> <tbody> <tr><td>GENERAL ANTIINFECTIVES, SYSTEMIC</td><td>57%</td></tr> <tr><td>MUSCULO-SKELETAL SYSTEM</td><td>13%</td></tr> <tr><td>CENTRAL NERVOUS SYSTEM</td><td>13%</td></tr> <tr><td>CARDIOVASCULAR SYSTEM</td><td>4%</td></tr> <tr><td>ALIMENTARY TRACT AND METABOLISM</td><td>4%</td></tr> <tr><td>RESPIRATORY SYSTEM</td><td>3%</td></tr> <tr><td>BLOOD AND BLOOD FORMING ORGANS</td><td>2%</td></tr> <tr><td>Other</td><td>1%</td></tr> </tbody> </table> </div> <p data-bbox="851 1252 1366 1284">Figure 3.F: ADRs caused by different drug groups. in 2004</p> <p data-bbox="1052 1300 1187 1332">Source: FDA</p>	Year	# of ADR reports	1983	176	1984	234	1985	295	1986	243	1987	330	1988	658	1989	663	1990	743	1991	963	1992	1,250	1993	2,303	1994	3,360	1995	3,901	1996	4,352	1997	4,344	1998	6,380	1999	9,649	2000	9,119	2001	14,000	2002	17,730	2003	18,405	2004	12,400	Drug Group	Percentage	GENERAL ANTIINFECTIVES, SYSTEMIC	57%	MUSCULO-SKELETAL SYSTEM	13%	CENTRAL NERVOUS SYSTEM	13%	CARDIOVASCULAR SYSTEM	4%	ALIMENTARY TRACT AND METABOLISM	4%	RESPIRATORY SYSTEM	3%	BLOOD AND BLOOD FORMING ORGANS	2%	Other	1%	
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Table 3.A: Description of Problem Areas (continued)

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)
Chemical accidents: Industry	Regions with major industrial areas	Statistics of chemical accidents during 2001 - 2004 revealed that the frequency of incidences was in the range of 23 - 28 annually (Figure 3.G); resulting in a number of injuries and deaths (Figure 3.H). The major causes of chemical accidents were leakage of chemicals, followed by fire/ explosion and land transport mishaps.	<ul style="list-style-type: none"> ▪ Explosive substances

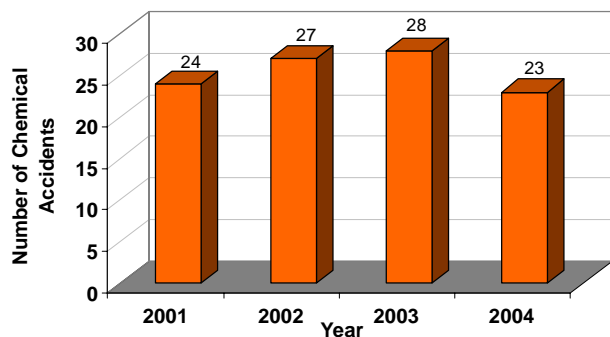


Figure 3.G: Chemical accidents in Thailand during 2001 – 2004

Source: Department of Disaster Prevention and Mitigation / Ministry of Interior

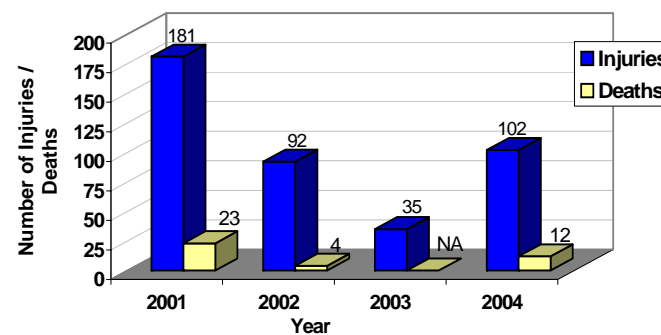


Figure 3.H: Statistic of injuries and death caused by chemical accidents during 2001 – 2004

Source: Department of Disaster Prevention and Mitigation / Ministry of Interior

Table 3.A: Description of Problem Areas (continued)

Nature of Problem	City/Region	Brief Description of Problem	Chemical(s)/ Pollutant(s)
Chemical accident: Transport	Bangkok	Transport misfortune of trucks carrying chemicals is the most common cause. In 2001, a truck had an accident on an express way in Bangkok releasing acrylonitrile onto the road and drainage. In a separate incident, an explosion was caused by an LPG-containing truck accident in Bangkok. System for transportation of hazardous substances needs to be strengthened, in order to prevent the occurrence of chemical transport accidents.	<ul style="list-style-type: none"> ▪ LPG ▪ Acrylonitrile
Hazardous Waste Treatment / Disposal	National	<p>The amount of hazardous waste generated nationwide in 1999 - 2003 was about 1.7 million tons per year; estimated by PCD, of which 78% was from the industrial sector. The remainder was generated from households, commercial services and public health services. In 2003, Thailand had 5 types of disposal facilities operating within the National Jurisdiction: stabilized and secured landfill, infectious waste incinerator, fuel blending and co-incineration in cement kiln, recycling of lead from used lead-acid batteries, and solvent recovery. Only 44% of total hazardous wastes were managed by the above facilities.</p> <p>Some of hazardous wastes are illegally dumped and go through informal sector for recycling business.</p> <p>In 2003, the total amount of infectious waste was 4,150 tons of which 85% were incinerated at On-Nuch Infectious Waste Incinerator in Bangkok.</p>	<ul style="list-style-type: none"> ▪ 23 categories of hazardous wastes # ▪ Infectious waste
<p># Note:</p> <ul style="list-style-type: none"> ▪ I1 e.g. Glues/adhesives, paints and paint wastes, discarded solvents, thinners, used spray cans, diesel fuel, gasoline, kerosene ▪ I2 e.g. machine lubricants & oils, lubricating fluids ▪ I3 e.g. Break fluid and transmission fluid, oil filters, used-oil cans ▪ C1 e.g. rust remover, varnish ▪ C2 e.g. car battery acids, rust removal liquids ▪ R1 e.g. Swimming pool chemicals ▪ R2 e.g. Waste explosives ▪ T1 e.g. Silver bearing wastes (scrap film and photo paper) silver contaminated sludge ▪ T2 e.g. Mercury-switches ▪ T3 e.g. Substances containing PCBs ▪ T4 e.g. Misc. Photographic chemicals (Colour developer wastes) ▪ T5 e.g. Detergents and Bleach ▪ T6 e.g. Spent filter cartridges, laundry sludge ▪ T7 e.g. car engine coolants ▪ T8 e.g. Cooling tower sludge and sediment ▪ T9 e.g. Used lead-acid batteries ▪ T10 e.g. Dry cell batteries ▪ T11 e.g. Fluorescent light bulbs ▪ In1 e.g. Syringes, Tissues, bloods ▪ Ra1 e.g. Radioactive wastes ▪ O1 e.g. Refrigerants (CFC-12) ▪ O2 e.g. Partially unreacted chemicals (testing samples) ▪ O3 e.g. Anesthetic gas containers 			

Table 3.B: Priority Concerns Related to Chemicals

Nature of Problem	Scale of Problem	Level of Concern	Ability to Control Problem	Availability of Statistical Data	Specific Chemicals Creating Concerns	Priority Ranking*
Air Pollution (vehicles)	National	High	Medium	Sufficient	PM ₁₀ CO	1
Air Pollution (construction)	Local	Medium	High (Bangkok) Medium (Rural)	Insufficient	TSP, PM ₁₀ , silica	1
Air Pollution (industries)	Regional	Medium	Medium	Sufficient	TSP, PM ₁₀ , silica, asbestos, SO ₂ , Cl ₂ , NO ₂ , VOCs, dioxin, pesticides, fume of heavy metal	1
Air Pollution (power plant)	Local	High	High	Sufficient	SO ₂ , TSP, NO _x	2
Air Pollution (Healthcare Workplace) e.g. hospitals	Local	Low	Medium	Insufficient	N ₂ , O ₂ , ethylene oxide, alcohol, glutaraldehyde, formaldehyde, acid-base, VOCs, radiation	3
Air Pollution (Petroleum Station)	Local	Medium	Medium	Insufficient	VOCs	2
Air Pollution (Service Workplace) e.g. hotels and restaurants	Local	Medium	Medium	Insufficient	VOCs, smoke, radiation, heavy metals	3

* **Note:** Priority Ranking 1 = Very high 2 = High 3 = Moderate 4 = Low

Table 3.B: Priority Concerns Related to Chemicals (continued)

Nature of Problem	Scale of Problem	Level of Concern	Ability to Control Problem	Availability of Statistical Data	Specific Chemicals Creating Concerns	Priority Ranking*
Inland Waterway	National	Medium	Medium	Sufficient	FCB	2
Marine Pollution	Local	Medium	Medium	Sufficient	Heavy metals (mercury, cadmium, arsenic, fluorine and lead)	2
Ground Water Contamination	National	Medium	Medium	Insufficient	Lead, cadmium, arsenic, fluorides	3
Soil Contamination	National	Medium	Low	Insufficient	Insecticides (organophosphates, carbamates and organochlorines), Herbicides (paraquat and glyphosate), Heavy metals (lead, cadmium, arsenic, mercury, nickel and chromium)	3
Hazardous waste disposal / treatment	Regional	High	Low	Insufficient	Hazardous wastes	2
Unknown chemical import	Regional	Medium	Low	Insufficient	N.A.	2
Occupational Health: Agriculture	National	High	Medium	Sufficient	Insecticides (organophosphates, carbamates and organochlorines), Herbicides (paraquat and glyphosate)	1

* **Note:** Priority Ranking 1 = Very high 2 = High 3 = Moderate 4 = Low

Table 3.B Priority Concerns Related to Chemicals (continued)

Nature of Problem	Scale of Problem	Level of Concern	Ability to Control Problem	Availability of Statistical Data	Specific Chemicals Creating Concerns	Priority Ranking*
Occupational Health: Industrial	National	High	Medium	Sufficient	Silica, asbestos, organic solvents, pesticides, chemical fertilizers, heavy metals (lead, arsenic, cadmium, mercury, nickel, manganese and chromium), gas (NH ₃ , CO ₂ , CO, NO ₂ , O ₂ , SO ₂ , Cl ₂), and acid-base	2
Occupational Health: Service (Workplace)	Regional	Medium	Medium	Insufficient	Smoke, TSP, PM ₁₀ , organic solvents, gas, radiation	3
Occupational Health: Local SMEs	Regional	Medium	Medium	Insufficient	Organic solvents (benzene, toluene, chloroform, trichloroethylene, ethyl alcohol, methyl alcohol, acetone, and etc.), TSP, PM ₁₀	2
Drinking Water Contamination	Regional	High	Medium	Insufficient	Lead, arsenic, cadmium, endosulfan	2

* **Note:** Priority Ranking 1 = Very high 2 = High 3 = Moderate 4 = Low

Table 3.B: Priority Concerns Related to Chemicals (continued)

Nature of Problem	Scale of Problem	Level of Concern	Ability to Control Problem	Availability of Statistical Data	Specific Chemicals Creating Concerns	Priority Ranking*
Chemical Residues in Food	National	High	High	Insufficient	Pesticides, heavy metal, veterinary drugs, synthetic colorants misused chemicals (formalin, borax, and etc.), preservatives	1
Banned chemical residues in traditional medicines	Regional	Medium	Medium	Insufficient	Steroids, arsenic	3
Banned chemicals in cosmetics	Regional	Medium	Medium	Insufficient	Mercury, Ammoniated mercury, Hydroquinone, Vitamin A acid and Some colouring agents	3
Chemicals Poisoning / Suicides	Regional	Low	Medium	Sufficient	Medicines, Pesticides, Cleansing products	3
Environmental Health Problem	National	Medium	Medium	Insufficient	Organochlorine, , 12 POPs, VOCs, metals	3

* **Note:** Priority Ranking 1 = Very high 2 = High 3 = Moderate 4 = Low

Table 3.B: Priority Concerns Related to Chemicals (continued)

Nature of Problem	Scale of Problem	Level of Concern	Ability to Control Problem	Availability of Statistical Data	Specific Chemicals Creating Concerns	Priority Ranking*
Adverse reactions of health and consumer products	National	Medium	Medium	Sufficient	Medicines Hazardous products for household use Cosmetics	2
Chemical accidents: Industry	Regional	High	Medium	Sufficient	Explosive, Corrosive and Toxic substances	1
Chemical accident: Transport	Regional	High	Medium	Insufficient	LPG, and Dangerous goods	1

* **Note:** Priority Ranking 1 = Very high 2 = High 3 = Moderate 4 = Low

CHAPTER IV

Legal Instruments and Non-Regulatory Mechanisms for Managing Chemicals

4.1 Overview of the National Legal Instruments Which Address the Management of Chemicals

Chemical management in Thailand involves a number of governmental agencies; each of which has employed its legal instrument to regulate specified chemicals under its responsibility. Presently, there are 4 ministerial notifications, 1 ministerial regulation, 1 decree, and 13 acts, being used as legal tools by 10 ministries as follows:

1. Ministry of Agriculture and Cooperatives
2. Ministry of Commerce
3. Ministry of Defence
4. Ministry of Energy
5. Ministry of Finance
6. Ministry of Industry
7. Ministry of Interior
8. Ministry of Labour
9. Ministry of Public Health
10. Ministry of Science and Technology

Table 4.A shows the existing legal instruments and their references, addressing the management of chemicals.

Table 4.B gives an overview of the Legal Instruments which impose on chemical categories and their use for import, production, storage, transportation, distribution/marketing, use/handling, and disposal.

Table 4.C and 4.D demonstrate the existing banned chemicals or the Hazardous Substances Type 4 in List A and B, respectively, their conditions of use, and responsible agencies, which are promulgated by the Hazardous Substance Act B.E. 2535 (1992).

Table 4.A: References to Existing Legal Instruments Which Address the Management of Chemicals

Legal Instrument	Responsible Ministries or Bodies	Chemical Use Categories Covered	Objective(s) of Legislation	Relevant Articles/ Provision
1. Hazardous Substance Act 1992 (B.E. 2535)	Ministry of Industry	Industrial chemicals	- To control the production, import, export, having possession, disposal and use of hazardous substances in industrial sector.	- Section 18, 23, 36
	Ministry of Public Health	Pesticides and chemicals for consumer use	- To control the production, import, export , having possession, disposal and use of hazardous substances for public health purposes and in consumer products	- Section 18, 23, 36
	Ministry of Agriculture and Cooperatives	Pesticides used in agricultural sector	- To control pesticides according to the need of responsible authority - To select pesticides through registration process - To issue permits for production, import, export or having possession (sale, storage , transport) of pesticides with the purpose of preventing or minimizing danger inflicted upon human-beings, animals, plants , property and environment - To control quality of pesticides available in the market	- Section 18 - Section 36 - Section 23
	Ministry of Science and Technology	Radioactive	- To control radioactive according to the need of responsible authority - To issue permits for production, import, export or having possession (sale, storage , transport, and treatment)	- Section 18, 23, 36
	Ministry of Energy			
2. Fertilizer Act 1975 (B.E. 2518)	Ministry of Agriculture and Cooperatives	Chemical fertilizer	- To control the production, trade, import or transit of chemical fertilizer	
3. Public Health Act 1992 (B.E. 2535)	Ministry of Public Health	Substances being concerned as public nuisance	- To control public nuisance such as hazardous substances, dust, poisonous tar / ash not to impact human health and the environment	- Section 25, 44

Table 4.A: References to Existing Legal Instruments Which Address the Management of Chemicals (continued)

Legal Instrument	Responsible Ministries or Bodies	Chemical Use Categories Covered	Objective(s) of Legislation	Relevant Articles/ Provision
4. Drug Act 1967 (B.E. 2510) and amendments	Ministry of Public Health / FDA	Drug	<ul style="list-style-type: none"> - To control the production, import, export and sale of drugs by means of licensing - To control efficacy, safety and effectiveness of drugs sold in Thailand by means of drug registration and post-marketing surveillance - To control advertisement for the sale of drugs 	<ul style="list-style-type: none"> - Section 12, 46 - Section 79 - 86 - Section 88
5. Food Act 1979 (B.E. 2522)	Ministry of Public Health / FDA	Chemicals in food products	<ul style="list-style-type: none"> - To control Chemical substances added in or manufactured, imported or sold as food ingredients 	- Section 25, 26, 27
6. Cosmetic Act 1992 (B.E.2535)	Ministry of Public Health / FDA	Chemical ingredients used in cosmetic products	<ul style="list-style-type: none"> - To control quality and safety of cosmetic products with the emphasis on registration and monitoring system 	- Section 5, 16, 27, 33
7. Psychotropic Substance Act 1975 (B.E. 2518)	Ministry of Public Health / FDA	Psychotropic substances	<ul style="list-style-type: none"> - To control the production, importation , exportation, possession and sale of psychotropic substances 	- Section 6, 13, 16, 40, 46, 61 - 69, 70 - 87
8. Narcotics Act 1979 (B.E.2522)	Ministry of Public Health / FDA	Narcotic substances	<ul style="list-style-type: none"> - To control the production, importation, exportation, possession and sale of narcotic substances / preparations - To control and prevent abuse using of narcotic substances / preparation 	- Section 13, 15 – 22, 43, 46, 57 – 58
9. Emergency Decree on Prevention Against Abuse Using of Volatile Substances 1990 (B.E. 2533)	Ministry of Public Health / FDA	Volatile substances	<ul style="list-style-type: none"> - To control and prevent abuse using of volatile substances 	- Section 12 - 18
10. Medical Device Act 1988 (B.E. 2531)	Ministry of Public Health / FDA	Products and articles used for medical / veterinary purposes (affecting physiological structure / function)	<ul style="list-style-type: none"> -To control the production, importation, exportation, and sale of products defined as medical devices. 	- Section 40

Table 4.A: References to Existing Legal Instruments Which Address the Management of Chemicals (continued)

Legal Instrument	Responsible Ministries or Bodies	Chemical Use Categories Covered	Objective(s) of Legislation	Relevant Articles/ Provision
11. Customs Act 1926 (B.E. 2469) and 14 amendments 1991 (B.E. 2534)	Ministry of Finance / Customs Department	Imported and exported chemical products	<ul style="list-style-type: none"> - To collect customs duties - To collect taxes on imported and exported goods on behalf of other government agencies, such as value added tax, excise tax and municipal tax - To prevent and control smuggling of goods and other illegal products 	- Section 6 (6), 40, 61
12. Factory Act 1992 (B.E. 2535)	Ministry of Industry	Chemical waste, pollutants, and contaminants from factory operation	- To control factory operations regarding the disposal of waste, pollution or any contaminants having an impact on the environment	- Section 6, 8
13. Enhancement and Conservation of National Environmental Quality Act 1992 (B.E. 2535)	Ministry of Natural Resource and Environment	Chemical pollutants	- To prevent, control and remedy danger caused by contamination of pollutants or spread of pollution	- Section 32, 55, 78 - 79
14. Notification of Ministry of Interior Re: Occupational Safety with Respect to Working Environment 1977 (Chemicals) (B.E. 2520)	Ministry of Labour	121 Chemicals found in the workplace	- To set chemical threshold limit values in the workplace in order to protect workers from hazards of chemicals used in manufacturing process.	
15. Notification of Ministry of Interior Re: Occupational Safety Related to Dangerous Substances 1991 (B.E. 2534)	Ministry of Labour	Industrial Chemicals	- To protect workers from hazards of chemicals in all physical form (solid, liquid, and gas) which can cause corrosion, irritation, allergy, cancers, fire, explosion, and radiation.	

Table 4.A: References to Existing Legal Instruments Which Address the Management of Chemicals (continued)

Legal Instrument	Responsible Ministries or Bodies	Chemical Use Categories Covered	Objective(s) of Legislation	Relevant Articles/ Provision
16. Armament Control Act 1987 (B.E. 2530)	Ministry of Defence	Chemicals related with armament industry	- To control all armaments production, importation, possession and storage for prevention / mitigation of related hazards and maintenance of the national security.	
17. Notification of Hazardous Substance Committee Re: Land Transportation of Hazardous Substances 2002 (B.E. 2545)	Ministry of Industry Ministry of Agriculture and Cooperatives Ministry of Public Health	Chemicals in transportation	- To set up criteria and procedures for land transport of dangerous goods, based on the UN recommendations	
18. Rule of the Prime Minister Office on National Disaster Prevention 1995 (B.E.2538) and the amendments 2000, 2003 (B.E.2543, 2546)	Department of Disaster Prevention and Mitigation / Ministry of Interior	High-risk chemicals associated with accidents and massive disasters	- To coordinate plans and all operations on disaster prevention and mitigation.	
19. Notification of Ministry of Commerce Regarding Importation of Pharmaceutical Chemicals into Thailand 2002 (B.E. 2545)	Ministry of Commerce	16 Pharmaceutical chemicals severely restricted for importation	- To strictly control the importation of 16 pharmaceutical chemicals to prevent the abuse in animal farming; for supporting the national food safety policy.	

Table 4.B: Overview of Legal Instruments to Manage Chemicals by Use Category

Category of Chemical	Import	Production	Storage	Transportation	Distribution / Marketing	Use / Handling	Disposal
Pesticides							
- Agricultural	HSA	HSA	HSA	HSA	HSA	HSA	HSA
- Public Health	HSA	HSA	HSA	HSA	HSA	HSA	HSA
- Household	HSA	HSA	HSA	HSA	HSA	HSA	HSA
Fertilizers	Fertilizer Act	Fertilizer Act			Fertilizer Act		
Industrial Chemicals (used in manufacturing/ processing facilities)	HSA	HSA	HSA Ministry of Interior Notification Re: Occupational Safety Related to Dangerous Substances	HSA	HSA	HSA Ministry of Interior Notification Re: Occupational Safety Related to Working Environment (Chemicals)	HSA
Petroleum Products			Fuel Storage Act				

Table 4.B: Overview of Legal Instruments to Manage Chemicals by Use Category (continued)

Category of Chemical	Import	Production	Storage	Transportation	Distribution / Marketing	Use / Handling	Disposal
Consumer Products							
- Food	Food Act	Food Act	Food Act		Food Act	Food Act	
- Drugs	Drug Act	Drug Act	Drug Act		Drug Act	Drug Act	
- Cosmetics	Cosmetic Act	Cosmetic Act	Cosmetic Act		Cosmetic Act	Cosmetic Act	
- Household Chemicals	HSA	HSA	HSA		HSA	HSA	
- Medical devices	Medical Device Act	Medical Device Act	Medical Device Act		Medical Device Act	Medical Device Act	
Pharmaceutical Chemicals, strictly controlled for supporting the national food safety policy	Notification of MOC regarding importation of pharmaceutical chemicals into Thailand						
Chemicals Related with Armaments	Armament Control Act	Armament Control Act	Armament Control Act				
Chemical Wastes	HSA	HSA	HSA	HSA	HSA	HSA	

HSA = Hazardous Substance Act

The major Act to manage chemicals in Thailand is the Hazardous Substance (HZS) Act B.E. 2535 (1992) and being authorized to 7 agencies, i.e.

1. Department of Industrial Works (DIW), Ministry of Industry
2. Food and Drug Administration (FDA), Ministry of Public Health
3. Department of Agriculture (DOA), Ministry of Agriculture and Cooperatives
4. Department of Fisheries (DOF), Ministry of Agriculture and Cooperatives
5. Department of Livestock Development (DOLD), Ministry of Agriculture and Cooperatives
6. Office of Atoms for Peace (OOAFP), Ministry of Science and Technology
7. Department of Energy Business, Ministry of Energy

This Act classifies HZS into 4 types according to the needs for control as follows:

- Type 1:** HZS is that of which the production, import, export, or having in possession shall comply with the specified criteria and procedures. At present, there are 62 regulated items in HZS List A and 0 items in List B.
- Type 2:** HZS is that of which the production, import, export, or having in possession shall first be notified to the responsible authority and shall also comply with the specified criteria and procedures. At present, there are 61 and 13 regulated items in HZS List A and List B, respectively.
- Type 3:** HZS is that of which the production, import, export, or having in possession shall obtain a permit. At present, there are 787 and 88 regulated items in HZS List A and List B, respectively.
- Type 4:** HZS is that of which the production, import, export, or having in possession is prohibited. At present, there are 268 and 16 regulated items in HZS List A and List B, respectively.

The details of hazardous substances by agencies category is presented as follows;

List of Hazardous Substances; List A

Agency	Number of Chemicals				Total
	Types 1	Types 2	Types 3	Types 4	
Department of Industrial Works	57	28	124	53	262
Food and Drug Administration	2	20	106	113	241
Department of Agriculture	0	12	539	102	653
Department of Fisheries	3	1	8	-	12
Department of Livestock Development	0	0	0	0	0
Office of Atoms for Peace	0	0	8	0	8
Department of Energy Business	0	0	2	0	2
Total	62	61	787	268	1,178

List of Hazardous Substances; List B

Agency	Number of Chemicals				Total
	Types 1	Types 2	Types 3	Types 4	
Department of Industrial Works	0	0	87	15	102
Food and Drug Administration	0	5	0	1	6
Department of Agriculture	0	5	0	0	5
Department of Fisheries	0	0	0	0	0
Department of Livestock Development	0	3	0	0	3
Office of Atoms for Peace	0	0	0	0	0
Department of Energy Business	0	0	1	0	1
Total	0	13	88	16	117

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Acetophenone- 4-methoxy-3-methyl	10024-90-5	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Aldicrab	116-06-3	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Aldrin	309-00-2	DOA	-
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
4-Aminodiphenyl	92-67-1	DOA	-
		FDA	-
Amitrole	61-82-5	DOA	-
		FDA	-
ANTU	86-88-4	FDA	In products for household or public-health use which intend to eradicate rodents
Aramite	140-57-8	DOA	-
Arsenic trioxide (crude arsenic, white arsenic, arsenious acid, arsenious anhydride)	1327-53-3	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Asbestos (Crocidolite)	12001-28-4	DIW	-
Asbestos-Amosite	12172-73-5	DOA	-
		DIW	-
		FDA	-
Azinphos ethyl	2642-71-9	DOA	-
Azinphos methyl	86-50-0	DOA	-
Benzidene	92-87-5	DOA	-
		FDA	-
Beryllium oxide;(Beryllium monoxide)	1304-56-9	DIW	-
beta-HCH (1,3,5/2,4,6-hexachloro cyclohexane)	319-85-7	DOA	-
		FDA	-
BCH	608-73-1	DOA	-
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Binapacryl	485-31-4	DOA	-

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Bis(chloromethyl)ether	542-88-1	DOA	-
		DIW	-
		FDA	-
Bis(2-methoxyethyl) ether; (diethylene glycol dimethyl ether)	111-96-6	DIW	-
Bromophos	2104-96-3	DOA	-
Bromophos-ethyl	4824-78-6	DOA	Excluded those under FDA's responsibility
2-Bromopropane; (isopropyl bromide)	75-26-3	DIW	
tert-Butyl mercaptan (2-methyl-2-propanthiol)	75-66-1	FDA	In product used for temporary interfering body function with the purpose of self-protection or to harm others
Cadmium and cadmium compound	-	DOA	-
		FDA	-
Calcium arsenate	7778-44-1	DOA	-
		DIW	-
		FDA	-
CALOMEL	10112-91-1	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Capsaicin	404-86-4	FDA	In product used for temporary interfering body function with the purpose of self-protection or to harm others
Captafol	2425-06-1	DOA	-
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Carbon tetrachloride (tetrachloromethane)	56-23-5	FDA	In products for household or public-health use which intend to erase or correct misprinting, or to dissolve chemicals used for misprinting correction or dry cleaning of cloth or textile materials
		DOA	
Chloranil	118-75-2	FDA	
Chlordane	57-74-9	DOA	Excluded those under FDA's responsibility
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Chlordecone	143-50-0	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
		DOA	Excluded those under FDA's responsibility
Chlordimeform	6164-98-3	DOA	
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Chlorobenzilate	510-15-6	DOA	
		DIW	
		FDA	
(R)-1-Chloro-2,3-epoxypropane; (R-Epichlorohydrin)	51594-55-9	DIW	
Chlorofluorocarbon	-	FDA	As propellant in aerosol or spray products except pharmaceutical or skin cooling products
(2RS,3RS)-3-(2-Chlorophenyl)-2-(4-fluorophenyl)- [(1H-1,2,4-Triazol-1-yl)-methyl]oxirane; (Epoiconazole)	106325-08-0	DIW	-
Chlorophenols	25167-80-0	DOA	-
Chloropicrin	76-06-2	DIW	-
Chlorothiophos	60238-56-4	DOA	Excluded those under FDA's responsibility
Copper arsenate hydroxide	16102-92-4	DOA	-
		DIW	-
		FDA	-
Crimidine	535-89-7	FDA	In products for household or public-health use which intend to eradicate rodents
Cyanogen (Ethanedinitrile, Oxalonitrile, Dicyan)	460-19-5	DIW	-
Cycloheximide	66-81-9	DOA	Excluded those under FDA's responsibility
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Cyhexatin	13121-70-5	DOA	

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Daminozide	1596-84-5	DOA	
DBCP	96-12-8	DOA	
		FDA	
DDT	50-29-3	FDA	
		DOA	
Decabromobiphenyl	13654-09-6	DOA	
		DIW	
		FDA	
Demephion	8065-62-1	DOA	
Demeton	8065-48-3	DOA	
2,3-Dibromopropane-1-ol; (2,3-dibromo-1-propanol)	96-13-9	DIW	
Di (phenylmercury) dodeccenyl succinate [di (phenylmercury) dodeccenyl -3- succinate]	27236-65-3	DIW	
		FDA	
Dicofol	115-32-2	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Dicrotophos	141-66-2	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Dieldrin	60-57-1	DOA	
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Diethylene glycol monobutyl ether acetate	124-17-4	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Dimefox	115-26-4	DOA	
2,4-Dinitroanisole	119-27-7	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
2,5-Dinitrotoluene	619-15-8	DIW	
3,4-Dinitritoluene	610-39-9	DIW	
Dinitrocresol; (DNOC)	534-52-1	FDA	In products for household or public-health

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Dinoseb and its salts	88-85-7	DOA	
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Dinoterb	1420-07-1	DOA	
Disulfoton	298-04-4	DOA	
DNOC	534-52-1	DOA	
Dyes	-	FDA	In food products or food additives
EDB	106-93-4	DOA	
EDB (Ethylene dibromide)	106-93-4	DIW	
		FDA	
Endosulfan	115-29-7	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
		DOA	Excluded CS FORMULATION
Endrin	72-20-8	DOA	
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
EPN	2104-64-5	FDA	
1,3,5-tris-[(2 <i>sand</i> 2 <i>R</i>)-2,3-epoxypropyl]-1,3,5-triazine-2,4,6-(1 <i>H</i> ,3 <i>H</i> ,5 <i>H</i>)-tione; (Teroxione)	59653-74-6	DIW	
Ethanethiol (Ethyl mercaptan; Ethyl sulfhydrate)	75-08-1	FDA	In product used for temporary interfering body function with the purpose of self-protection or to harm others
Ethion	563-12-2	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Ethyl hexyleneglycol (Ethyl hexane diol ; Ethohexadiol)	94-96-2	FDA	
		DOA	
		DIW	
Ethylene dichloride	107-06-2	DOA	
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Ethylene oxide(1,2-Epoxyethane)	75-21-8	DOA	
		FDA	Excluded those used for antiseptic purpose in infirmaries

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Ethylidine diacetate	542-10-9	DIW	
Fensulfothion	115-90-2	DOA	
Fentin	668-34-8	DOA	
Flumioxazin(iso); (<i>n</i> -(7-fluoro-3,4-dihydro-3-oxo-4-prop-2-ynyl-2 <i>H</i> -1, 4-benzoxazin-6-yl)cyclohex-1-ene-1,2-dicarboxamide)	103361-09-7	DIW	
Fluoroacetamide	640-19-7	DOA	
		FDA	In products for household or public-health use which intend to eradicate rodents
Fluoroacetate sodium	62-74-8	DOA	
		FDA	In products for household or public-health use which intend to eradicate rodents
luoroacetic acid and its salts	-	FDA	In products for household or public-health use which intend to eradicate rodents
a mixture of: 4-[[bis-(4-Fluorophenyl)-methylsilyl] methyl]-4 <i>H</i> -1,2,4-triazole; 1-[[bis-(4-Fluorophenyl)methyl-silyl] methyl]-1 <i>H</i> -1,2,4-triazole)	-	DIW	-
Fonofos (Racemate)	66767-39-3	DOA	-
Fonofos (unstated stereochemistry)	944-22-9	DOA	-
Fonofos [(R)-isomer]	62705-71-9	DOA	-
Fonofos [(S)-isomer]	62680-03-9	DOA	-
Heptachlor	76-44-8	DOA	-
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Hexabromobiphenyl	36355-01-8	DOA	-
		DIW	-
		FDA	-

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Hexachlorobenzene	118-74-1	DOA	-
		DIW	-
		FDA	-
Hydrocyanic acid; (Hydrogen cyanide)	74-90-8	FDA	In products for household or public-health
a mixture of : <i>N</i> -[3-Hydroxy-2-(2-methyl acryloylamino-methoxy)propoxy methyl]-2-methylacrylamide; (<i>N</i> -[2,3-bis (2-methyl acrylamide; methylacrylamide; 2-methyl - <i>N</i> -(2-methyl-acryloylamino methoxymethyl) -acrylamide; <i>N</i> -2,3-dihydroxypropoxymethyl)-2- methylacrylamide	-	DIW	-
6-Hydroxy-1-(3-isopropoxypropyl)-4- methyl-2-oxo-5-[4-(phenylazo)phenylazo]-1,2-digydro-3-pyridinecarbonitrile	85136-74-9	DIW	-
(6-(4- Hydroxy -3-(2-methoxyphenylazo) -2-sulfonato-7-naphthylamino)-1,3,5- triazin2,4-diy) bis[amino-1-methylethyl) -ammonium]formate	108225-03-2	DIW	-
Isazofos	42509-80-8	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Isobenzan	297-78-9	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Isodrin	465-73-6	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Kelevan	4234-79-1	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Lead arsenate	7784-40-9	DOA	-
		DIW	-
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Leptophos	21609-90-5	DOA	-
Lindane (>99% gamma-HCH or gamma-BHC)	58-89-9	DOA	-
MCPB	94-81-5	DOA	-
Mecoprop (racemate)	7085-19-0	DOA	-

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Mecoprop (unstated stereochemistry)	93-65-2	DOA	-
Mephosfolan	950-10-7	DOA	-
Mercury compound	-	DOA	-
Methamidophos	10265-92-6	DOA	-
		FDA	-
Methanol (Methyl alcohol)	67-56-1	FDA	In aerosol or spray products and in products which contact with the skin or food
Methanol (Methyl alcohol) >1% v/v	67-56-1	FDA	In products for use as fuel for cooking or warming
Methoxyacetic acid; (2- Methoxyacetic acid; Methyl ether)	625-45-6	DIW	-
Methoxychlor	72-43-5	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Methyl bromide; (Bromomethane)	74-83-9	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Methyl isocyanate	624-83-9	DIW	-
Mevinphos	26718-65-0	DOA	-
Mevinphos	7786-34-7	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
MGK repellent-11	126-15-8	DOA	-
		FDA	-
Mirex	2385-85-5	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
		DOA	-
		DIW	-
Monocrotophos	2157-98-4	DOA	-
Monocrotophos	6923-22-4	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Naled	300-76-5	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Naphthylamine	134-32-7	DOA	-
		FDA	-

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
n-Butyl mercaptan (1-Butanethiol)	109-79-5	FDA	In product used for temporary interfering body function with the purpose of self-protection or to harm others
n-Butyl-dl-malate	-	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Nickel tetracarbonyl	13463-39-3	DIW	-
4-Nitrodiphenyl	92-93-3	DOA	-
		FDA	-
Nitrofen	1836-75-5	DOA	-
N-methylactamide; (Aactylmethylamine; Methyl acetamide)	79-16-3	DIW	-
o- Dichlorobenzene	95-50-1	DOA	-
		FDA	-
Octabromobiphenyl	27858-07-7	DOA	-
		DIW	-
		FDA	-
Omethoate	1113-02-6	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Oxydemeton-methyl	301-12-2	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Paraquat dichloride	1910-42-5	FDA	-
Parathion	56-38-2	DOA	-
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Parathion-methyl	298-00-0	DOA	-
		FDA	-
Paris green	12002-03-8	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
		DOA	Excluded those under FDA's responsibility
PAVA	2444-46-4	FDA	In product used for temporary interfering body function with the purpose of self-protection or to harm others

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Pentachlorophenate sodium (Pentachlorophenoxide sodium)	131-52-2	DIW	-
		DOA	-
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Pentachlorophenol	87-86-5	DOA	Excluded those under FDA's responsibility
		DIW	-
Pentachlorophenol and its salts	-	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Phenothiol (MCPA-thioethyl)	25319-90-8	DOA	-
Phenthoate	2597-03-7	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
2-Phenylcyclohexanol	1444-64-0	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Phenyl glycidyl ether; (2,3-Epropylpropyl phenyl ether; 1,2-Epoxy-3-phenoxypropane)	122-60-1	DIW	-
Phenylhydrazine	100-63-0	DIW	-
Phenylhydrazinium sulphate(2:1)	52033-74-6	DIW	-
Phenylmercuric oleate (PMO)	104-60-9	DIW	-
		FDA	-
Phenylmercury acetate	62-38-4	DIW	-
		FDA	-
Phorate	298-02-2	DOA	-
Phosmet	732-11-6	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Phosphamidon	13171-21-6	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
		DOA	-
Phosphine	7803-51-2	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
Phosphorus	7723-14-0	DOA	-
		FDA	-
<i>p</i> -Methoxybenzyl alcohol	105-13-5	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Polychlorinate biphenyl	1336-36-3	DIW	-
Polychlorinate terphenyl (PCT)	61788-33-8	DOA	-
		DIW	-
		FDA	-
Prothoate	2275-18-5	DOA	-
Pyrinuron (Piriminil)	53558-25-1	DOA	-
		FDA	-
Quintozene; (PCNB)	82-68-8	FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
<i>R</i> -2,3-epoxy-1-propanol	57044-25-4	DIW	-
Safrole	94-59-7	DOA	-
		DIW	-
		FDA	-
Schradan (Octamethylpyrophos-phoramide, OMPA)	152-16-9	DOA	-
		FDA	-
sec-butyl mercaptan (2-Butanethiol)	513-53-1	FDA	In product used for temporary interfering body function with the purpose of self-protection or to harm others
Silvex	93-72-1	FDA	-
Skunk oil	-	FDA	In product used for temporary interfering body function with the purpose of self-protection or to harm others
Sodiumarsenite	7784-46-5	DOA	-
Sodium chlorate	7775-09-9	DOA	-
Sodium chromate	7775-11-3	DIW	-
Strobane (Polychloroterpenes)	8001-50-1	DOA	-
		FDA	-
Sulfotep	3689-24-5	DOA	-
2,4,5-T	93-76-5	DOA	-

Table 4.C: Banned Chemicals according to Hazardous Substance Act (List A) (continued)

Hazardous Substances	CAS NO.	Responsible Agencies	Conditions
TDE or DDD [1,1-Dichloro-2,2-bis (4-chlorophenyl) ethane]	72-54-8	DOA	-
		FDA	-
TEPP	107-49-3	DOA	-
Tetrachloroethane; (Acetylene tetrachloride; 1,1,2,2-Tetrachloroethane)	79-34-5	FDA	In products for household or public-health
(+/-) Tetrahydrofurfuryl(<i>R</i>)-2-[4-(6-chloroquinoxalin-2-yloxy)phenoxy] propionate	119738-06-6	DIW	-
Thallium sulfate	7446-18-6	DOA	-
		DIW	-
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
Thionyl chloride (Sulfurous oxychloride)	7719-09-7	DIW	-
Toxaphene (Camphechlor)	8001-35-2	DOA	-
		FDA	In products for household or public-health use which intend to prevent, control, repel or eradicate insects or other pests
2,4,5-TCP (2,4,5-Trichlorophenol)	95-95-4	DOA	-
		DIW	-
		FDA	-
2,4,5-TP	-	DOA	-
1,1,1-Trichloroethane; (Methyl chloroform)	71-55-6	FDA	In products for household or public-health
tris(2,3-dibromopropyl)phosphate	126-72-7	DOA	-
		FDA	-
trisodium[4'-(8-acetylamino-3,6- disulfonato-2-naphthylazo)-4''-(6-benzoylamino-3-sulfonato-2-naphthylazo) biphenyl-1,3',3'',1'''-tetraolato-0,0',0'',0'''] copper (II)	-	DIW	-
Vinyl chloride monomer (monochloroethene)	75-01-4	DOA	-
		FDA	As propellant in aerosol or spray products
Zinc phosphide	1314-84-7	FDA	In products for household or public-health use which intend to eradicate rodents

Table 4.D: Banned Chemicals according to Hazardous Substance Act (List B)

Hazardous Substances	CAS.NO	Responsible Agencies	Condition (s)
O-Alkyl(< C10, include cycloalkyl) alkyl (Me, Et, n-Pr or i-Pr)-phosphonofluoridates e.g. Sarin: O-Isopropyl methylphosphonofluoridate Soman: O-Pinacolyl methylphosphonofluoridate	107-44-8 96-64-0	DIW	Hazardous substances controlled under Schedule 1A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
O-Alkyl (< C10, include cycloalkyl) N,N- dialkyl (Me, Et, n-Pr or i-Pr) phosphoramidocyanidates e.g. Tabun: O-Ethyl N,N-dimethyl phosphoramidocyanidate	77-81-6	DIW	Hazardous substances controlled under Schedule 1A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
O-Alkyl (H or < C10, include cycloalkyl) S-2-dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr)phosphonothiolates and corresponding alkylated or protonated salts e.g. VX: O-Ethyl S-2-diisopropylaminoethyl methyl phosphonothiolate	50782-69-9	DIW	Hazardous substances controlled under Schedule 1A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
Alkyl (Me, Et, n-Pr or i-Pr)phosphonyldifluorides e.g. DF: Methylphosphonyldifluoride	676-99-3	DIW	Hazardous substances controlled under Schedule 1B (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
O-Alkyl (H or < C10, include cycloalkyl)O-2-dialkyl (Me, Et, n-Pr or i-Pr)-aminoethyl alkyl (Me, Et, n-Pr or i-Pr) phosphonites and corresponding alkylated or protonated salts e.g. QL:O-Ethyl O-2-diisopropylaminoethyl methylphosphonite	57856-11-8	DIW	Hazardous substances controlled under Schedule 1B (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
Chlorosarin: O-Isopropyl methylphosphonochloridate	1445-76-7	DIW	Hazardous substances controlled under Schedule 1B (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
Chlorosoman: O-Pinacolyl methylphosphonochloridate	7040-57-5	DIW	Hazardous substances controlled under Schedule 2A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
Amiton: O,O-Diethyl S-[2-(diethylamino)ethyl] phosphorothiolate and corresponding alkylated or protonated salts	78-53-5	DIW	Hazardous substances controlled under Schedule 2A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons

Table 4.D: Banned Chemicals according to Hazardous Substance Act (List B) (continued)

Hazardous Substances	CAS.NO	Responsible Agencies	Condition (s)
Lewisites: Lewisite 1: 2-Chlorovinylchloroarsine Lewisite 2: Bis(2-chlorovinyl)chloroarsine Lewisite 3: Tris(2-chlorovinyl)arsine	541-25-3 40334-69-8 40334-70-1	DIW	Hazardous substances controlled under Schedule 1A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
Nitrogen mustards : HN1: Bis(2-chloroethyl)ethylamine HN2: Bis(2-chloroethyl)methylamine HN3: Tris(2-chloroethyl)amine	538-07-8 51-75-2 555-77-1	DIW	Hazardous substances controlled under Schedule 1A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
PFIB: 1,1,3,3,3-Pentafluoro-2- (trifluoromethyl)- 1-propene	382-21-8	DIW	Hazardous substances controlled under Schedule 2A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
BZ: 3-Quinuclidinyl benzilate	6581-06-2	DIW	Hazardous substances controlled under Schedule 2A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
Ricin	9009-86-3	DIW	Hazardous substances controlled under Schedule 1A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
Sulfur mustards: 2-Chloroethylchloromethylsulfide Mustard gas : Bis (2-chloroethyl) sulfide Bis (2-Chloroethylthio) methane Sesquimustard: 1,2-Bis(2-chloroethylthio) ethane 1,3-Bis(2-chloroethylthio)-n-propane 1,4-Bis(2-chloroethylthio)-n-butane 1,5-Bis(2-chloroethylthio)-n-pentane Bis(2-chloroethylthiomethyl)ether O-Mustard: Bis(2-chloroethylthioethyl)ether	2625-76-5 505-60-2 63869-13-6 3563-36-8 63905-10-2 142868-93-7 142868-94-8 63918-90-1 63918-89-8	DIW	Hazardous substances controlled under Schedule 1A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
Saxitoxin	35523-89-8	DIW	Hazardous substances controlled under Schedule 1A (Toxic chemicals) in the Annex attached to the Convention on the Prohibition of Chemical Weapons
Products containing major substance(s) used for temporary interfering body function with the purpose of self-protection or to harm others	-	FDA	-

Table 4.E: Banned Chemicals in Cosmetics under the responsibility of Food and Drug Administration

Name of Chemicals	Detail of Restriction
Antibiotics	- In all cosmetic products
Arsenic and its compounds and mineral	- In all cosmetics products Arsenic content must not exceed 5 ppm
Azelaic acid or other names which have the same structural formula	- In all cosmetic products
Benzene	- In all cosmetic products
Benzoyl peroxide or other names which have the same structural formula as benzoyl peroxide	- In all cosmetic products
Barium and its salts	- If Barium sulfate, and its salts (lakes and pigments) are used in cosmetic, soluble barium content must not exceed 0.05 % weight calculated as barium chloride.
Carbon disulfide	-
Corticosteroids	- In all cosmetic products
Carbon tetrachloride	- In all cosmetic products
Chlorhexidine and its digluconate, diacetate and hydrochloride or other names which have the same structural formula	- If used as preservatives in mouthwash preparations, chlorhexidine and its salts must not exceed 0.3% calculated as chlorhexidine.
Chloroform	- In all cosmetic products.
Cantharides- Whole, powder and galenical preparations	- In all cosmetic products
Formaldehyde	- In all cosmetic products. Except in the following conditions: 1. Formaldehyde Content, used as preservatives in cosmetic must not exceed 0.2 % 2. Formaldehyde Content must not exceed 0.1 % in mouthwash preparations 3. Formaldehyde Content must not exceed 5 % in nail products.
Hexachlorophene	- In all cosmetic products
Hydroquinone	- Hydroquinone is banned in all cosmetic products for skin whitening, if used in hair color preparations, hydroquinone content must not exceed 2.0% - In all cosmetic products
Hormones	-

Table 4.E: Banned Chemicals in Cosmetics under the responsibility of Food and Drug Administration (continued)

Name of Chemicals	Detail of Restriction
Lead, its compounds and minerals	- Lead content must not exceed 20 ppm in all cosmetic products. Except for the use of lead acetate in hair color products. The content of lead must not exceed 1.75 % calculated as lead
Mercury, its compounds and minerals	- Except in the following conditions: 1. Mercury content must not exceed 0.5 ppm in all cosmetic products; 2. Content of phenyl mercuric salts, used as preservatives in eye make-up preparation, must not exceed 0.0065 %; calculated as mercury metal; 3. Thimerosal or thimerosal content, used as preservatives in eye make-up preparation, must not exceed 0.0065 %; calculated as mercury metal; 4. If chemicals Mentioned in (1) and (2) are in the same preparation the total mercury content must not exceed 0.0065 %
Methanol	- In all cosmetic products
Metallic nitrites	- In all cosmetic products
Methylene chloride or dichloromethane or other names which have the same structural formula as methylene chloride	- In all cosmetic products
4-Methyl-m-phenylenediamine and its salts	- In all cosmetic products
Minoxidil or other names which have the same structural formula as minoxidil	- In all cosmetic products
Monobenzene or monobenzyl ether of hydroquinone or p-bebzyloxyphenol or other names which have the same structural formula as monobenzone	- In all cosmetic products
Magnesium sulfate adduct of dipyrithioe	- In all cosmetic products
Nitrobenzene	- In all cosmetic products
2 -Naphthol or beta naphthol	- In all cosmetic products
o- Phenylenediamine and its salts	- In all cosmetic products

Table 4.E: Banned Chemicals in Cosmetics under the responsibility of Food and Drug Administration (continued)

Name of Chemicals	Detail of Restriction
Pyrogallol	- In all cosmetic products
Possium chlorate	- In all cosmetic products
Padimate A	- In all cosmetic products
Phenol and its alkaline salts	- Phenol content, used in soap and shampoo as preservative, must not exceed 1 %
Retinoic and, its derivatives esters and salts	- In all cosmetic products
Radioelements , their salts and derivatives preparations of all kinds including natural or artificial radioelements, , their salts and derivatives	- In all cosmetic products
Resorcinol	Except in the following conditions: 1. In hair color products, resorcinol content must not exceed 5 %. 2. In other hair products resorcinol content must not exceed 0.5 %.
Sodium peroxide or other names which have the same structural formula as sodium peroxide	- In all cosmetic products
Sodium pyrithione or sodium (2- pyridylthio) – n-oxide or other names which have the same structural formula as sodium pyrithione	- Except the use in specially – controlled cosmetics
Toxin, modified and non-modified	- In all cosmetic products

Table 4.F: Banned chemicals in Food Products under the responsibility of Food and Drug Administration

Name of Chemicals	Detail of Restriction
AF – 2 or furylframide (2-(-2 furyl) – 3 –(5 –nitro -2 -furyl) acrylamide	- For use as food additive
Brominated vegetable oil	- For use as food additive
Boric acid	- For use as food additive
Borax	- For use as food additive
Cyclamic acid and its salts (except sodium Cyclamate)	- For production, import, or sale as food additive.
Calcium iodate and potassium iodate (except when used for nutritional purpose preventing iodine deficiency, under the approval by food and drug administration)	- For use as food additive
Coumarin or 1,2- benzopyrone or 5,6 benzopyrone or cis-o-coumaric acid, anhydride, or o-hydroxycinnamic acid, lactone	- For use as food additive
Daminozide or succinic acid 2,2- dimethyl-hydrazide (Alar)	- For production, import, or sale as food additive
Dulcin (Paraphenetolecarbamide)	- For production, import, or sale as food additive
Dihydrocoumarin or benzodihydropyrone or hydrocoumarin	- For use as food additive
Diethylene glycol or dihydroxydiethyl ether or diglycol or 2,2-oxybis- ethanol or 2,2-oxydiethanol	- For use as food additive
Food comprising dulcin, AF-2 or cyclamate acid and its salts (except sodium cyclamate)	- For use as food additive
Formaldehyde, formaldehyde solution and paraformaldehyde	- For use as food additive
Methylalcohol or methanol	- For use as food additive
Nitrofurazone	- For use as food additive
Potassium chlorate	- For use as food additive
Salicylic acid	- For use as food additive

Table 4.G: Severely Restricted Pharmaceutical Chemicals for Importation under the responsibility of the Ministry of Commerce (in order to prevent the abuse in animal farming; supporting the National Food Safety Policy)

Name of Chemicals
Aristolochia <i>spp.</i>
Chloramphenicol
Chloroform
Chlorpromazine
Colchicin
Dapsone
Diethylstilbestrol
Dimetridazole
Fluoroquinolones
Glycopeptides
Ipronidazole
Metronidazole
Nitrofurans
Nitroimidazoles
Ronidazole
Sulfonamides

CHAPTER V
Ministries, Agencies and Other Institutions Managing Chemicals

5.1 Responsibilities of Different Government Ministries, Agencies and other Institutions

Table 5.A.1: Responsibilities of Government Ministries, Agencies and other Institutions concerning Pesticides

Ministry / Department concerned	Importation	Production	Storage	Transport	Distribution/ Marketing	Use/Handling	Disposal
Agriculture and Cooperatives	X	X	X	X	X	X	X
Commerce / Trade	X		X		X		
Finance/ Customs	X		X				
Industry	X	X	X				X
Interior / Civil Defense			X	X			X
Labour		X	X			X	
Natural Resources and Environment		X	X	X		X	X
Public Health	X	X	X		X	X	X
Transport / Port Authority	X		X	X			

Note: X indicates ministry or government agency taking responsibility.

Table 5.A.2: Responsibilities of Government ministries, Agencies and other Institutions concerning Industrial Chemicals

Ministry / Department concerned	Importation	Production	Storage	Transport	Distribution/ Marketing	Use/Handling	Disposal
Agriculture and Cooperatives							
Commerce / Trade	X	X	X		X		
Finance/ Customs	X		X				
Industry	X	X	X	X	X	X	X
Interior / Civil Defense			X	X			X
Labour		X	X			X	
Natural Resources and Environment		X	X	X		X	X
Public Health						X	X
Transport & Port Authority	X		X	X			

Note: X indicates ministry or government agency taking responsibility.

Table 5.A.3: Responsibilities of Government Ministries, Agencies and other Institutions concerning Consumer Products

Ministry / Department concerned	Importation	Production	Storage	Transport	Distribution/ Marketing	Use/Handling	Disposal
Agriculture and Cooperatives							
Commerce / Trade	X	X	X		X		
Finance/ Customs	X		X				
Industry	X	X	X				X
Interior / Civil Defense			X	X			X
Labour		X	X				
Natural Resources and Environment		X	X	X		X	X
Public Health	X	X	X	X	X	X	X
Transport & Port Authority	X		X	X			

Note: X indicates ministry or government agency taking responsibility

In Thailand, chemical substances are divided by their use categories into industrial chemicals, agricultural chemicals (fertilizers and pesticides), and consumer chemicals (household pesticides, cleansing products, disinfectants, pharmaceuticals and other products for medical and personal care). Chemicals management involves all stages of the chemical life cycle from import & export, production, transport, storage, marketing and use to disposal. Thailand has promulgated laws, regulations and standards for the management of chemical substances (as mentioned in Chapter 4), to build up a complete and sound system for chemicals management.

Mostly, chemical substances in Thailand begin their life cycle as imported entities. Hence the Customs Department is the first gate for the control of chemicals entering to the kingdom and it is the most important point in the chemical life cycle where a mechanism to regularize inflow of chemicals to the country can effectively be applied. Production, storage, marketing, and usage activities are manipulated by many agencies. Besides, there are more than one department in each Ministry undertaking the control of one chemical substance and its different impact whether on health or the environment. Hence, there appear to be some overlaps or gaps in the mandates of ministries as far as the chemical management is concerned. Since some chemical substances, such as pesticides are versatile---they can be used both in farms and household settings. Ministry of Agricultural and Cooperatives is primarily responsible for the consumption of a given amount of pesticides in the country in order to be able to produce an agreed amount of agricultural products in a year, while Ministry of Public Health keeps an eye on household pesticides. However, this gap is fulfilled when both of ministries work together and exchange relevant information. Last but not least, Ministry of Natural Resources and Environment is responsible for disposal of every chemical waste.

CHAPTER VI

RELEVANT ACTIVITIES OF INDUSTRY, PUBLIC INTEREST GROUPS AND RESEARCH SECTOR

This chapter describes relevant activities carried out by various organizations that support the infrastructure for managing chemicals in Thailand. These organizations are grouped as industry, public interest groups/community groups, and the research groups which are mostly governmental agencies. All of these organizations play important roles in chemicals management in recent years. An overview of their activities is presented based on the information contributed by the organizations themselves through questionnaires and brainstorming sessions.

The types of ongoing activities of the above mentioned groups are summarized in Table 6.A. They represent many sections of the Thai community and embrace a wide variety of concerns and perspectives. Their diverse programs and activities are described in more details in the following sections.

Table 6.A: Summary of activities carried out by industry, public interest groups and research sector

Field of Activities	Industry	Public Interest Group	Research Sector
Data Collection	✓	✓	✓
Testing of Chemicals	✓		✓
Risk Assessment	✓		✓
Risk Reduction	✓		✓
Policy Analysis	✓	✓	✓
Training and Education	✓	✓	✓
Research on Alternatives and management tools		✓	✓
Monitoring		✓	✓
Information on Workers (Industry and agriculture)	✓	✓	✓
Information to Public	✓	✓	✓

6.1 Relevant Industrial Organizations

Industrial organizations have the aim of supporting the members of industry they represent. Increasingly, they are interacting with the government programs and responding to community concerns. The following organizations have one way or another influenced and contributed to the progress in chemical management.

6.1.1 Chemical Industry Club, The Federation of Thai Industries

The Chemical Industry Club (CIC) under the Federation of Thai Industries (FTI) is a center for disseminating information, knowledge, and news to its members and also interacts with relevant governmental agencies on behalf of its members. The CIC is a non-profit organization having 185 members at present. It has played role and function in chemicals management and chemical safety programs, and in particular, in promoting Responsible Care program. In addition, CIC actively participates in policy formulation and regulation implementation processes, normally initiated by government agencies and other related organizations.

The CIC focuses primarily on activities involving data collection, testing of chemicals, risk assessment, and risk reduction, with the aim to directly manage industrial use of chemicals. Examples of the ongoing programs to serve its members are environmental impact assessment reporting, occupational safety health program (TIS 18000 or OHSAS 18000), environmental management system (ISO 14000), and hazard/risk assessment reporting. Not only serving its members, CIC offers training and education also to the governmental agencies interested. Workers and general public are, in addition, considered important target audience for the circulation of useful and new information.

The Thailand Responsible Care Program has been recognized as a successful endeavor of CIC. The program was officially registered as the 41st member of the Responsible Care Leadership Group by the International Council of Chemical Association (ICCA) since September 1998. Each chemical company joining the program has a commitment, signed by the company's Chief Executive Officer, to continuously carry out sound management of chemical production and handling with transparency to all stakeholders. The company has to ensure the participation of all employees in the performance improvement. The program helps companies to identify and spread good management practices, and also promotes mutual support between companies and associations through experience sharing and peer pressure.

The followings are the activities accomplished by the Responsible Care Management Committee of Thailand (RCMCT):

1) Publishing the Guiding Principles both in Thai and English for members. Seventy-four CEOs or General Managers have become members who have the rights to use the program's name and logo but strictly under specified rules. The RCMCT developed 6 specific Codes of Management Practices for certain areas of chemicals management in 2003. These include community awareness & emergency response, process safety, employee health & safety, pollution prevention, product distribution, and product stewardship.

2) Conducting six codes training sessions, seminars and forum to establish and expand understanding of the basic principles and of the six codes. In addition to training, RCMCT has established the "Ambassador Program" consisting of a group of volunteer experts to communicate, as speakers, the basic principles and the general knowledge of responsible care to any interested parties. The RCMCT has initiated the process of establishing a knowledge center comprising six code experts from the program's members. The six code experts constitute the core knowledge center. They provide guidance and consultation on each of the six codes as well as the respective trends and activities, in Thailand and other countries.

3) RCMCT has shared the Responsible Care philosophy, experience, knowledge and benefits with many stakeholder groups in the form of communication / dialogue and participation in activities and events. Many activities have been completed and are illustrated as follows:

- Bi-monthly meeting for sharing ideas/experiences and communication.
- Four task forces: Responsible Care Activity Promotion; Codes of Management Practice Implementation; Communication and Public Relations / International Liaison; and Technical and Training, to set strategies and directions, and to follow up actions.
- Publishing quarterly newsletter, status report every two years, and brochures.
- Thailand Responsible Care website, launched in the third quarter of 2005.
- RCMCT/CIC coordination in providing chemical's Global Harmonizing System training for the trainers with DIW and JETRO.

6.1.2 Thai Crop Protection Association

The Thai Crop Protection Association (TCPA) is an industrial organization to encourage and support the members to operate their business in a responsible manner. It seeks solutions and benefits to plant growers through the integrated use of agricultural chemicals in an uncompromising nature with respect to operators, consumers and

environmental safety. TCPA establishes various sub-committees to work on many programs including technical and government affairs, industrial standards, quality control, safe use program and integrated pest management, code of conduct, and public relations. It offers training courses and seminars, and has compiled the material safety data sheets for 300 ingredients of crop protection chemicals, which are available in CD-Rom.

In recent years, TCPA has focused its effort on several initiatives for safe use of chemicals. The outcomes particularly useful for businesses include guideline on safe transportation of pesticides, guideline on waste management of pesticide packaging, and guideline on crisis and emergency management for pesticide manufacturing facilities.

6.2 Relevant Public Interest Groups/Community Groups

Increasingly the public interest groups have emerged and actively involved in chemicals management. Most of the activities focus on data collection and monitoring to obtain information about the effects of chemicals on health and the environment. Other activities involve policy analysis and research on chemical alternatives. Some groups deal with specific issues such as occupational health and safety, and environment. In recent years, a few NGOs lead by the Campaign for Alternative Industry Network (CAIN) have been active in the area of third party rights especially the community rights to know. They have conducted specific campaigns to get access to government's and industry's documents on chemicals management.

6.2.1 Occupational Health and Safety at Work Associations

The Occupational Health and Safety at Work Associations (OHSWA), a non-governmental organization, has a function to promote and disseminate knowledge of techniques in occupational health and safety at work. OSHWA activities related to chemical management include training and education to members and interested public, and publishing of a journal to provide information to workers and publics.

6.2.2 Campaign for Alternative Industry Network

Campaign for Alternative Industry Network (CAIN), an independent non-profit organization of Thai-nationals, works directly with local communities affected by industrial pollution to raise social and environmental justice in Thai society through grass-roots empowerment in legal and political dimensions. It works cooperatively with international organizations, governmental bodies, Thai NGOs, and local communities, focusing on building communities' capacity to defend their own rights and livelihoods.

Since its establishment in 1997, CAIN has provided support and extended the outreach via research, distributing information, monitoring and campaign to protect the basic human rights and to build sustainable development. Though CAIN is involved primarily in industrial policy, it has concerns on other issues, such as the impacts of hazardous substances on ecosystem, safe use of chemicals, and local communities and worker's health.

During 2003-2004 CAIN has emphasized more on chemical issues particularly the public rights to know, as follows:

- Since 2003, CAIN has initiated the "Thai Rights to Know (TRTK)" Project aiming to conduct a knowledge-based campaign on the community's rights to know, specifically advocated for a legally enforceable Pollutants Release and Transfer Register (PRTR) mechanism development. The project explored international PRTR development and subsequently drafted a roadmap of Thailand's PRTR to compliment its unique socio-cultural context.
- In 2004, CAIN conducted a study project on the accessibility to pollutants release and transfer register for public safety with support from The Thailand Research Fund. The project explored emission of toxic chemicals from Map Ta Put industrial area to identify the types of information available to publics. It also assessed the information accessibility of people and local communities and the type of information they need to facilitate good health and environmental safety.

6.2.3 Alternative Agriculture Network

The Alternative Agriculture Network (AAN), a coordinating body among NGOs and civil society organizations, aims to strengthen local communities in developing agricultural alternatives and systems that operate in harmony with local ecology and culture of grass roots communities. The ANN builds up capacity for self-reliance economy among small-scale farmers, and to promote economic and social justice for a sustained and happy society.

ANN is an active coordinator in developing the campaign "Chemical Threat" during the National Health Assembly Forum held in 2004. The campaign has addressed chemical hazard to public health and food safety. The ANN moves forward in conducting a project on "Sustainable Agriculture System Development to Promote Health" which is supported from the Thai Health Promotion Fund.

6.2.4 Thailand Environment Institute

The Thailand Environment Institute (TEI) is a non-profit NGO focusing on environmental issues and the conservation of natural resources in Thailand. By working closely with the private sector, government, local communities, and other civil society partners both local and international circle, TEI helps to formulate environmental directives and link policy with action to encourage meaningful environmental progress. TEI also functions as

research institute and center information. In area of chemicals management, TEI conducts various researches on hazardous waste recycling and clean technology.

6.3 Relevant Research Organizations

There are universities and research institutions offering courses in various disciplines related to chemistry ranging from fundamental chemistry, analytical chemistry, environmental chemistry, eco-toxicology, and so on. A number of research institutions conduct researches on chemical safety and environmental protection with supporting fund from local sources and international donors. The research framework varies depending on institution's interests. Thailand's second National Master Plan on Chemical Management has addressed the research and development as one of the five strategies to implement during 2002 - 2006. In the 2nd NMP, Thailand Research Fund has been designated as coordinating agency for guiding the research direction to be more integrated and serve the needs of all stakeholders.

The followings are organizations actively involved in education and research in chemical safety as well as environmental and health protection related to chemicals.

6.3.1 The Thailand Research Fund

The Thailand Research Fund (TRF), a funding and managing research agency, grants support to research that is significant to national development, both for basic research and applied research where results can be used directly.

TRF has set up research framework on chemical safety and funded projects to universities, NGOs, and various governmental agencies. This framework also supports Thailand's Second National Master Plan on Chemical Management (NMP) in building up the body of knowledge and technology for policy and planning, development, and problem solving, in response to the essential strategies of the NMP.

The followings are examples of research studies that generate outcome currently in use in the national system:

- The development of a chemical information flows model used in tracking chemicals from the source of origin/entry. This enables a more accurate collection of import statistics in linkage with subsequent flows for use in different categories. The ability to track the quantity and location of a chemical throughout its life cycle contributes to the improvement of safety management and prevention of illicit practices;
- The development of a mechanism to acquire, coordinate and administer databases that pool all the information on chemicals and safety. A platform was

also developed to disseminate the information and knowledge to society at large. In 2003, the platform launched a series of public forum on “Challenges in Participatory Management of Chemical Safety in Thailand”. The key topics of the public forum were selected from agenda items of the Intergovernmental Forum on Chemical Safety (IFCS) – Forum IV. The outcome of the forum was depicted in a information paper distributed during the meeting of IFCS Forum IV in Bangkok during 1-7 November 2003.

6.3.2 Chulabhorn Research Institute

The Chulabhorn Research Institute (CRI) promotes and conducts basic as well as applied research of national importance, particularly the research that improves quality of life. CRI focuses its activities on 3 major areas: research; education/training and scientific exchange; and special projects and programs. CRI plays a key role on environmental toxicology and conducts various researches on risk assessment and risk reduction, such as:

- environmental and health risk assessment on pesticide use;
- health risk assessment on workers and communities from volatile organic chemicals exposure; and
- health risk assessment on traffic polices from air pollution exposure in Bangkok.

CRI places a strong emphasis on the training program in Environmental Toxicology and Biotechnology, operated by the International Centre for Environmental and Industrial Toxicology (ICEIT) for specific target groups, e.g. scientists, academics, governmental officials, and industrial personnel.

6.3.3 The Health System Research Institute

The Health System Research Institute (HSRI) is the governmental organization established by the order of Health System Research Institute Act 1992. The organization is small in size of structure but flexible in the administration and having high performance. The HSRI can be regarded as the country’s major supporting agency for health systems research. The main job is conducting research to build up the new body of knowledge for the improvement of the nation’s health systems, in response to dynamic changes in economic and social situation. The institute emphasizes on building the connection between academia, policy makers and all stakeholders in health systems. The effective connection is constructed on the basis of research management through multi-participatory approach.

HSRI’s operation within the last decade has built up a lot of valuable experiences. The HSRI successful performance is indicated by tools and mechanisms that continuously drive the health system reform. The institution’s policy and strategy can be divided into 2 phases as follows:

- Phase I (1992 – 1998): *Development of health research system*
- Phase II (1998 - 2004): *Research for health system reform*

HSRI creates several important institutional mechanisms that drive health system reform. One important instrument is National Health System Reform Office (HSRO) which is the secretariat body for National Health System Reform Committee (NHSRC). The committee is responsible for formulating a National Health Act and advocating the civil society, public interest groups and media in the process of the nation's health system reform. This partnership building process will ensure the sustainability of health system development.

6.3.4 The Thai Health Promotion Foundation

The Thai Health Promotion Foundation (ThaiHealth) was established by virtue of the Thai Health Promotion Foundation Act, B.E. 2544 (2001). It is a state agency which is not part of the bureaucratic system but is under the supervision of the Prime Minister. It commenced operations in April 2001 (in the form of a public organisation until November 2001). The responsibilities of ThaiHealth are to advocate, stimulate, support and provide funding to various organisations in society for health promotion activities, with a view to reducing infirmity and premature death rates. ThaiHealth aims to trigger a change in behavioural patterns and beliefs as well as in our living environment in such a way that is conducive to a better quality of life. Its main source of funding comes from a two percent levy imposed on alcohol and cigarette taxes (sin taxes).

ThaiHealth has continuously supported public agencies, academic institutions, private sectors and civil society organizations to conduct operation research and health promotion activities on:

- Health & Risk Reduction, e.g. Consumer protection
- Learning for Well-being, e.g. Knowledge building and informal learning for Thai youth
- Healthy Workplace, e.g. Improvement of healthy workplace in industries, educational institutions and government offices.
- Healthy Community, e.g. Province-, City-, and Community-base integrated development project.

6.3.5 Universities

1) National Research Center for Environmental and Hazardous Waste management (NRC-EHWM) is a consortium of five universities in Thailand with Chulalongkorn University being the lead university working with Chiangmai University, Khon Kaen University, King Monkut University of Technology Thonburi, and Prince of Songkla University. The Center's activities encompass two main elements - research and

postgraduate programs - which are inter-related and focus on the management of hazardous substances.

The Center's current research areas are:

- Hazardous waste treatment and disposal,
- Industrial ecology and waste utilization,
- Ecological impact and risk assessment,
- Remediation technology, and
- Chemical management policy.

In 2001, NRC-EHWM established the Chemical Information Management Unit (CIMU) to conduct a specific task in managing the chemical safety information and doing research work in collaboration with the government and private sectors. One of the major activities is to provide and maintain a website, <http://www.chemtrack.org>, where the Chemical Reference Database and information on regulations are posted for public use, together with the statistics of imported chemicals. In addition, CIMU proactively operates a knowledge platform on Chemical safety, a mechanism to build and manage knowledge through research and public forum for the purpose of sound management of chemical safety with support from Thailand Research Fund.

2) Environmental Research Institute of Chulalongkorn University (ERIC) is an entity entrusted with policy and operation research concerning various issues in environmental management. Much of the work has been instrumental in the national development planning and implementation process. Efforts have been made to link up with the private sector, NGOs and other social groups, leading to their participation in a variety of actions to solve environmental problems. In providing the information and research reports to the public, ERIC publishes two periodical journals, one quarterly in Thai and the other in English twice a year. A number of meetings, seminars and training have been organized by ERIC, aiming at increasing knowledge and understanding of environmental issues.

3) Institute of Health Research of Chulalongkorn University (IHR) conducts multidisciplinary research and serves as a research collaborating center with outside agencies and the university's academic entities involved in health research. Its research division on chemical safety focuses on community based research covering pesticide toxicology and pesticide risk assessment module.

4) Research Institute for Health Science of Chiang Mai University (RIHES) conducts health science research in multidisciplinary approach including public health problems in northern Thailand and the Greater Mae Khong Sub-region (GMS). The institute offers Master of Health Science Degree, a two year international program by research.

RIHES conducts many projects in the area of chemical management / safety, mostly concentrated on impact from the misuse of pesticides. Examples are the development on methodology to test pesticide residue, and the health impact from agrochemicals exposure in orchard plantation.

5) Faculty of Science in public and private universities. B.Sc., M.Sc., and Ph.D. degrees in chemistry are offered in most universities. In general, a basic chemistry course is required by other major of science and engineering degrees, and is serviced by Department of Chemistry. The ongoing research in most chemistry departments covers various areas of chemistry and often extends its service in chemical analysis to government and private sectors. Some universities have taken up chemical safety practice initiatives. For example, Khon Kaen University disposes inorganic wastes from laboratories at the waste treatment plant of the Science Faculty; Thammasart University trains the students and staff in the Faculty of Science and Technology who are in contact with chemicals to ensure proper and safe handling. The lack of proper disposal of chemicals is still a common problem in most universities.

6.4 Comment/Analysis

This chapter provides an insight into an array of organizations involved with chemicals management apart from the designated government agencies. These organizations often supply the government with valuable data for addressing specific concern and special issues. However, they do not have full access to government decision-making process.

Thailand Second National Master Plan on Chemical Management (2002-2006) was formulated with an emphasis on systematic management of chemicals with full participation of all stakeholders. The coordinating mechanism was carried out proactively in the preparatory process. With the Second National Master Plan and through the management by funding agency, the research direction is at present more focused and is expected to give a stronger impact in solving the national chemical problems. This coordinating mechanism could be modified and strengthened to become a part of Thailand's chemical management infrastructure.

CHAPTER VII

INTER-MINISTERIAL COMMISSIONS AND COORDINATING MECHANISMS

7.1 Inter-ministerial Commission and Coordinating Mechanisms

Achieving the national goal of chemical safety requires substantial cooperation among governmental agencies, private sector and other stakeholders. In order for the improvement of chemical safety scheme, two major mechanisms of coordination have been established. The first category of mechanism creates *Interministerial bodies*, appointed by the Cabinet, with major responsibility in formulating the national policies and plans corresponding to specific concerns. For example, the National Coordinating Committee on Chemical Safety is an inter-ministerial commission in charge of developing the National Master Plan for Chemical Management, monitoring, evaluation and making recommendations to address chemical-related problems. The second category of coordinating mechanism encompasses *Standing Committees*, established by legislation, in order to regulate different aspects of their respective chemicals.

Table 7.A describes in details the inter-ministerial coordinating mechanisms and commissions related with chemical safety scheme in Thailand, including their structure and specific missions.



7.2 Comments and Analysis

Thailand's organizational scheme for chemical safety covers a least 13 concerned ministries having authority under laws and regulations addressing diverse chemical groups as well as different stages in their life cycle. The existing coordination mechanisms are Inter-ministerial Commissions and Standing Committees established on the basis of policy development and legislative administration, respectively. The coordinating mechanisms have continuously evolved in terms of their structure and scope of participation. As a result of major reforms in the social, political and governmental sectors after the promulgation of the new Constitution B.E. 2540 (1997), public influence and participation at the national policy development has been improved.

The civil society organizations, industry and academia have been encouraged to play active roles in the formulation of Thailand National Master Plan (NMP) for Chemical Management, as official members of the National Coordinating Committee on Chemical Safety and their daughter sub-committees. This creates more balanced and more knowledge-based development of national strategies for sound chemical management. The prime aim of NMP formulation is to coordinate policies for the national program on chemical safety with emphasis on optimization of resource utilization. The 1st NMP for Chemical Management (1997-2001) comprised 3 major plans for the development of (1) body of knowledge and human resource, (2) administrative infrastructure, and (3) service system. Subsequently, the 2nd NMP (2002-2006) has been developed under more intensified and broad-based collaboration of various stakeholders. The 2nd NMP is composed of 5 essential strategies for the development of (1) national chemical information network, (2) emergency response and preparedness to prevent and handle chemical accidents, (3) chemical waste management, (4) national poison center network, and (5) research and development. Each strategy has a principal organization designated for coordinating the implementation, follow-up and evaluation of relevant activities.

In addition to the interministerial commission and coordinating mechanisms, several innovative mechanisms have also contributed to the nation chemical safety scheme by acting as a catalyst for the formation of civic movement. These novel mechanisms include Health System Research Institute (HSRI), National Health System Reforms Committee (NHSRC) and Thai Health Promotion Foundation (ThaiHealth). They have successfully created active platforms for civil society organizations and advocacy campaigns for the well-being of Thais, in the context of health promotion, health risk reduction, healthy workplace & community, and consumer protection.

Research activities can also be regarded as another coordinating tool, supplementing the above-mentioned mechanisms for chemical management. As an example, the Thailand Research Fund (TRF) and Thai Health Promotion Foundation (ThaiHealth) have contributed to this important role by supporting operational and policy research, as well as organizing public fora for governmental agencies, private sectors and NGOs. This helps addressing the cross cutting issues of chemical management which need holistic approach consideration.

Since chemical-related problems on health and the environment have become more complex and inter-related, inter-ministerial coordinating mechanisms have been operating systems in place; allowing open dialogues about current situations and developing pragmatic approaches to tackle the problems. There exists considerable increase in awareness raising and networking of policy-making and operational personnel from different ministries; resulting in more integrated management and less duplication of works for chemical management. Under the pressure of rapid globalization and current government scheme, there is a conceptual shift from function-based policies of individual departments / ministries toward agenda-based policies for the nation, as well as area-based policies for decentralized administration. The national policy and planning process related to chemical safety has adapted accordingly.

However, fiscal austerity and workforce shortage, to a certain extent, have caused difficulties in implementation of plans and enforcement of related laws. Hence the strategic priorities for the future national chemical management need to be identified by integrated and multi-sectoral approach. Besides, a shared sense of responsibility and accountability for chemical safety should be taken root not only in public sector---political, managerial, technical levels, but also in business sector. There is some dissonance between current legislation and new direction of chemical management policy frameworks, in particular those encompass the national obligations under related international agreements. Linkage of policy-making commissions with legal mechanisms should, therefore, be strengthened. This will help reform the legal systems to cope appropriately with rapid changes in domestic situations, as well as international concerns pertaining to chemical management.

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
I Inter-ministerial body 1. National Coordinating Committee on Chemical Safety	-To establish the National Chemical Safety Policy - To formulate National Master Plan on Chemical Management -To develop recommendations for the improvement in legislation for chemical management - To promote research and development activities regarding chemical safety.	Food and Drug Administration (FDA)	The committee chaired by Public Health Minister, and composed of high-level representatives of 28 concerned governmental agencies , 1 science NGO, 1 public interest NGO, 2 industrial associations, and 4 experts.	National Master Plan on Chemical Management (NMP)
1.1 Sub-committee on Policy and Planning	- To formulate the National Master Plan on Chemical Management, by coordinating with all concerned agencies - To evaluate the achievements of NMP - To coordinate with all stakeholders in Thailand and relevant international organizations for consolidating national actions to advance the Intergovernmental Forum on Chemical Safety (IFCS) recommendations.	FDA	Representatives of 24 concerned public agencies and 8 NGOs.	- NMP - Evaluation of NMP's achievements
1.2 Sub-committee on Chemical Safety Information Network	-To coordinate the development of the national chemical information network (Strategy 1 in the 2 nd NMP for 2002-2006) - To analyze the status of chemical safety information and develop the information system & network in Thailand	FDA	Representative of 16 concerned governmental agencies and 3 NGOs.	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
	<ul style="list-style-type: none"> - To enhance efficiency of communication and collaboration, particularly the information exchange system of all concerned agencies at the domestic and international levels - To prepare operational plans for public relations regarding the implementation of the NMP - To develop chemical safety directory listing all related agencies in both public and private sectors. 			
1.3 Sub-committee on Research and Development	<ul style="list-style-type: none"> - To encourage and monitor research and development activities regarding chemical management (Strategy 5 in the 2nd NMP for 2002-2006) - To analyze surveillance system for monitoring health and environmental risks posed by chemicals -To provide recommendations to relevant agencies regarding the reduction of risk caused by chemicals. 	FDA	Representatives of 17 concerned agencies and 3 NGOs.	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
1.4 Sub-committee on Poison Center Network	<ul style="list-style-type: none"> -To encourage and monitor the development of national poison center network (Strategy 4 in the 2nd NMP for 2002-2006) - To coordinate operations and support capacity building of poison centers in these aspects : <ul style="list-style-type: none"> (1) Information Provision (2) Patient Management and Rehabilitation (3) Laboratory Services. 	FDA	Representatives of 22 concerned agencies, particularly in the clinical field.	
2. National Coordinating Committee on Food	<ul style="list-style-type: none"> - To formulate the National Food Safety Policy - To follow-up all operations for national food safety scheme and development of food industry - To encourage the collaboration among concerned agencies, both in public and private sectors - To promote research and development activities in the field of food technology/safety. 	FDA & Dept. of Medical Sciences (DMSc)	The committee chaired by Public Health Minister, and composed of high-level representatives of 26 concerned governmental agencies, 3 associations of food industry, and 1 association of food sciences.	National Food Safety Policy
3. National Drug Policy Committee	<ul style="list-style-type: none"> - To formulate the National Drug Policy - To formulate educational policy for medical sciences and public health personnel - To follow-up all operations regarding drug safety and development scheme - To make recommendations regarding the national drug policy and implementation - To promote research and development activities concerning modern and traditional / herbal medicines. 	FDA & DMSc	The committee chaired by Public Health Minister, and composed of high-level representatives of all concerned governmental agencies and NGOs.	National Drug Policy

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
4. National Coordinating Committee on Compliance with the International Convention Regarding Chemical Weapons Control	<ul style="list-style-type: none"> - To coordinate all operations of concerned organizations pursuant to the Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on their Destruction - To make recommendations regarding the national policy on chemical weapons. 	Hazardous Substance Control Bureau/ Department of Industrial Works (DIW)	High-level representatives of all concerned agencies.	Protection of OPCW-related Mission Act 2002 (B.E. 2545)

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
5. Occupational Safety and Health Improvement Committee	<ul style="list-style-type: none"> - To provide the recommendations on occupational safety / health and environment policies and standards to the Minister of Labour - To consider the priority of the occupational safety / health and environment standard notifications, regulations and ordinance to be issued by the Minister of Labour - To recommend the guideline to carry out the occupational safety / health and environment of Thailand to be in accordance with the International Labour Organization (ILO)-related Conventions and recommendations - To provide the consultations, suggestions and also to promote and to support the task related to occupational safety / health carried out by both public and private sector - To make and improve guidelines and codes of practice on occupational safety /health and environment for employers and employees in workplace - To promote research activities on occupational safety / health and environment - To support the development of occupational safety / health and environment information - To promote trainings on occupational safety /health and environment. 	National Institute of the Improvement of Working Conditions and Environment (NICE) / Department of Labour Protection and Welfare	High-level representatives of all concerned agencies.	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
6. Subcommittee on Structural Development of Management and Prevention System for Transport of Chemicals and Dangerous Substances	- To conduct policy of all concerned organizations, both in public and private sectors, for the safety of transporting chemicals and dangerous substances.	National Economic and Social Development Board (NESDB) / Office of the Prime Minister	High-level representatives of 26 concerned agencies.	
II Standing Committee 1. Hazardous Substance Committee	<ul style="list-style-type: none"> - To consider and make recommendations for all matters regarding administration of hazardous substances - To solve hazardous substance problems from any complaints received - To release the information on hazardous substance control to the public - To oversee and expedite the authorities, government bodies taking charge of various hazardous substance control - To perform other works as provided by law to be the mandate and duties of the committee. 	DIW/ Min. of Industry	Interministerial body chaired by the Permanent Secretary of Industry Ministry, and composed of representatives from: <ul style="list-style-type: none"> - Min. of Public Health - Min. of Industry - Min. of Agriculture and Co-operatives - Min. of Commerce - Min. of Interior - Min. of Natural Resources and Environment - Min. of Defense and including not more than 7 scholars and at least 2 of them from NGOs for the protection of health and environment.	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
1.1 Sub-committee on Agricultural Hazardous Substances Control	<ul style="list-style-type: none"> - To provide comments regarding agricultural hazardous chemicals to the Hazardous Substance Committee - To make recommendations concerning operational policies on agricultural hazardous substance control in compliance with Hazardous Substance Act 1992. 	Agricultural Hazardous Substances Division/ Dept. of Agriculture (DOA)	The sub-committee chaired by Permanent Secretary for Ministry of Agriculture & Co-operatives, and composed of 16 representatives from: <ul style="list-style-type: none"> - DOA - Dept of Agricultural Extension (DOAE) - Dept. of Fisheries - Dept of Livestock Development - FDA - Pollution Control Department (PCD) - Thai Industrial Standards Institute (TISI) - Kasetsart University. 	
1.2 Sub-committee on Agricultural Hazardous Substances Registration	<ul style="list-style-type: none"> - To give opinions concerning criteria and procedures including necessary steps in pesticide registration and withdrawal of registered pesticides - To consider experimental designs, to monitor experiments and to evaluate results for pesticide registration - To consider pesticide labeling for agricultural use. 	Agricultural Regulatory Division/ DOA	The sub-committee chaired by the Director General of Department of Agriculture and consisting of other 16 members from: <ul style="list-style-type: none"> - Entomology and Zoology Division - Plant Pathology and Microbiology Division 	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
			<ul style="list-style-type: none"> - Botany and Weed Science Division - Agricultural Toxic Substances Division - Horticulture Research Institute - Office of the Permanent Secretary for Min. of Agriculture - Department of Livestock Development - Department of Fisheries - Kasetsart University. 	
<p>1.3 Sub-committee on Monitoring Chemical Residues in Foods and Agricultural Products</p>	<ul style="list-style-type: none"> - To monitor and report situations and problems regarding chemical residues in foods and agricultural products - To conduct relevant research and coordinate all operations to manage chemical residue problems in foods and agricultural products. 	<p>Agricultural Production Science Research and Development Office / DOA</p>	<p>The sub-committee chaired by Director of Agricultural Production Science Research and Development Office, and composed of 12 representatives and experts from:</p> <ul style="list-style-type: none"> - FDA - DMSc - National Food Institute/ MOI - Federation of Thai Industries - TISI - Dept. of Fisheries - Dept of Livestock Development - 2 NGOs. 	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
1.4 Sub-committee on Standards of Hazardous Substances for Public Health and Household Use	<ul style="list-style-type: none"> - To provide comments on classification of hazardous substances for public health and household use - To make recommendations on policy and research for relevant consumer protection. 	Hazardous Substance control Group/ FDA	The sub-committee chaired by FDA Secretary-General, and composed of 5 experts and representatives from 3 concerned agencies and 2 NGOs.	
1.5 Sub-committee on Registration of Hazardous Substances for Public Health and Household Use	<ul style="list-style-type: none"> - To provide opinions on the development of criteria , procedures regarding registration of hazardous substances for public health and household use, as well as for the production, importation, transport, sale and waste disposal - To provide comments on the revocation of registered hazardous substances. 	Hazardous Substance control Group/ FDA	The sub-committee chaired by FDA Secretary-General, and composed of representatives from 6 concerned agencies, 1 NGO and an external expert.	
1.6 Sub-committee on Standards of Commercial Pest Control Services	<ul style="list-style-type: none"> - To establish criteria , standards and good practice guidance for commercial pest control services - To set up plans for the promotion of good practice in commercial pest control services. 	Hazardous Substance control Group/ FDA	The sub-committee chaired by Deputy Secretary- General of FDA, and composed of representatives from 4 concerned agencies, 2 associations of private sector, and 3 experts.	
1.7 Sub-committee on Production Standard Promotion for Hazardous Substances under FDA Control	<ul style="list-style-type: none"> - To develop criteria for Good Manufacturing Practices (GMP) of hazardous substance production under FDA control - To provide recommendations on the promotion of GMP in related industries -To give the authorities comments on the evaluation of production sites according to the GMP criteria. 	Hazardous Substance control Group/ FDA	The sub-committee chaired by FDA Secretary-General, and composed of representatives from 5 concerned agencies, 2 industrial associations and 2 external experts.	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
1.8 Subcommittee on Analysis of Hazards posed by Chemicals	<ul style="list-style-type: none"> -To consider and conduct toxicity and risk assessment of chemicals for classification as hazardous substances under Hazardous Substance Act -To monitor the registration of hazardous substances as well as other actions designated by the Hazardous Substance Act - To provide technical consultation towards the Hazardous Substance Committee. 	DIW	The sub-committee chaired by FDA Secretary- General, and composed of representatives from 9 concerned agencies and technical experts.	
1.9 Sub-committee on Development of Ministerial Regulations and Notifications issued under Hazardous Substance Act 1992 (B.E.2535)	<ul style="list-style-type: none"> - To prepare drafting of ministerial regulations and notifications to be issued under Hazardous Substance Act 1992 (B.E.2535) - To consider technical problems regarding the control of hazardous substances in compliance with international standards, and make recommendations. 	DIW	The sub-committee chaired by high-level delegate from Office of the Council of State, and composed of representatives from 9 concerned agencies and law experts.	
1.10 Sub-committee on Consideration of Ministerial Regulations and Notifications issued under Hazardous Substance Act 1992 (B.E.2535)	<ul style="list-style-type: none"> - To consider the drafts of ministerial regulations and notifications to be issued under Hazardous Substance Act 1992 (B.E.2535) - To give comments on criteria and procedures of operations according to Hazardous Substance Act. 	DIW	The sub-committee chaired by the Honorable Member from Office of the Council of State, and composed of representatives from 11 concerned agencies and law experts.	
1.11 Sub-committee on Hazardous Substance Information Network	<ul style="list-style-type: none"> - To promote the generation of information regarding hazardous substances by responsible agencies -To coordinate the network of hazardous substance information - To encourage information exchange and related training. 	DIW	The sub-committee chaired by Director of Hazardous Substances Control Bureau/ DIW, and composed of representatives from 5 concerned agencies, and 2 industry/ toxicology associations.	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
1.12 Sub-committee on Development of Criteria for Transporting Hazardous Substances	-To provide the Hazardous Substance Committee comments on criteria, control measures and procedures for transporting hazardous substances	Office of Transport and Traffic Policy and Planning/ Min. of Transport	The sub-committee chaired by an Honorable Inspector for Ministry of Transport, and composed of representatives from 15 concerned agencies, 3 chemical transport-related associations and 3 air transport and insurance companies.	
1.13 Sub-Committee on Implementation of the Montreal Protocol	<ul style="list-style-type: none"> - To develop the national operation plans for reducing the use of Ozone-Depleting Substances (ODSs) according to the Montreal Protocol - To establish policies to control production, importation, use and disposal of ODSs - To study problems and obstacles against the national actions to comply with the obligation of the Montreal Protocol - To provide comments regarding the Montreal Protocol to all related committees and governmental agencies. 	Hazardous Substances Control Bureau /DIW	The sub-committee chaired by Director General of Department of Industrial Works, and composed of representatives from 14 concerned agencies and ODSs experts.	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
2. Drug Committee	<p>- To make recommendations on both regulatory and technical aspects concerning drug control Note: There are 16 subcommittees under the Drug Committee dealing with specific aspects as follows:</p> <ol style="list-style-type: none"> 1. Traditional and herbal medicines registration approval 2. Modern medicines/new drugs registration approval for human use 3. Modern medicines/generic drugs registration approval for human use 4. Modern medicines/biological products registration approval for human use 5. Modern medicines registration approval for veterinary use 6. Re-evaluation of registered medicines for human use 7. Safety Surveillance of drug utilization 8. Review and approval of drug advertisements 9. Establishment of good manufacturing practice (GMP) requirements 10. Approval of manufacturing or importing medicines for clinical studies 11. Establishment of requirements for bioequivalence studies 12. Good Clinical Practice (GCP) inspection of clinical studies 	FDA	The Drug Committee, chaired by the Permanent Secretary for Ministry of Public Health, and composed of 14 high level representatives of concerned organizations and 5-9 drug experts.	Drug Act 1987 (B.E.2530)

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
	<ul style="list-style-type: none"> 13. Establishment of guideline on problem-solving of pharmaceutical raw materials and products for veterinary use 14. Evaluation and approval of pharmaceutical quality and testing for compliance with quality standard 15. Licensing approval of manufacturers, importers, distributors and drugstores 16. Specific assignments, e.g. growth hormone products, and etc. 			
3. Cosmetic Committee	- To make recommendations on regulatory and technical aspects concerning specially-controlled cosmetics.	FDA	The Cosmetic Committee chaired by the Permanent Secretary for Ministry of Public Health, and composed of 13 representatives from government sectors and not more than six experts (not more than 2 experts coming from private sector)	Cosmetic Act 1992 (B.E.2535)
4. Food Committee	- To make recommendations regarding administration of food products.	FDA	The Food Committee, chaired by the Permanent Secretary for Ministry of Public Health, and composed of 11 high-level representatives of concerned governmental agencies and not more than 9 food	Food Act 1979 (B.E.2522)

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
			experts, partly representing manufacturers, importers or dealers of food products.	
5. Three Committees on "Psychotropic Substances Control", "Narcotics Control" and "Prevention Against Abuse Using of Volatile Substances"	- To provide comments and recommendations concerning the control of psychotropic substances, narcotics and volatile substances, respectively.	FDA	These committees chaired by the Permanent Secretary for Ministry of Public Health, and consisting of high-level representatives of concerned agencies and relevant experts.	-Psychotropic Substant Act.1992 (B.E.2535) -Narcotic Act. 1992 (B.E.2535) -Emergency Decree on Prevention against Abuse Using of Volatile Substances 1990 (B.E.2533)
6. National Environmental Board	<ul style="list-style-type: none"> - To submit policy and plan for enhancement and conservation of national environmental quality to the Cabinet for approval - To prescribe environmental quality standards - To consider and give approval to the Environmental Quality Management Plan proposed by the Minister - To consider and give approval to each provincial action plan for environmental quality management - To make recommendations to the Cabinet in respect of financial, fiscal, taxation and investment promotion measures for the implementation of the policy and plan for enhancement and conservation of national environmental quality 	Min. of Natural Resources and Environment (MONRE)	Interministerial body chaired by the Prime minister, Deputy Prime minister, and composed of representatives from: <ul style="list-style-type: none"> - MONRE - Min. of Defense - Min. of Finance - Min. of Agriculture and Cooperatives - Min. of Transport - Min. of Interior - Min. of Education 	Enhancement and Conservation of National Environmental Quality Act 1992 (B.E. 2535)

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
	<ul style="list-style-type: none"> - To propose for amendment or improvement of laws related to the enhancement and conservation of environmental quality to the Cabinet - To consider and give approval to the action plans for prevention and remedy of danger caused by contamination of pollutants or spread of pollution - To consider and give approval to the setting of emission or effluent standards - To supervise, oversee and expedite the enactment of royal decrees and issuance of ministerial regulations, rules, local ordinances, notifications, bye-laws and orders which are necessary to ensure systematic operation of the laws related to enhancement and conservation of environmental quality to the fullest extent possible -To submit opinions to the Prime Minister for his directions in case it appears that any government agency or state enterprise infringes or refrains from complying with the laws and regulation for environmental protection which may cause extensive damage to the environment - To specify measures for strengthening and fostering of cooperation and coordination among government agencies, state enterprises and the private sector in matters concerning the promotion and conservation of environmental quality - To supervise the related fund management and administration 		<ul style="list-style-type: none"> - Min. of Public Health - Min. of Industry - Office of the National Economic and Social Development Board - Office of the Board of Investment - The Bureau of Budget. 	

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
	<ul style="list-style-type: none"> - To submit reports on national environmental quality situation to the Cabinet at least once a year - To perform other functions provided by the Act or other related laws to be within the authority of the National Environmental Board. 			

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
6.1 Pollution Control Committee	<ul style="list-style-type: none"> - To submit an action plan for prevention or remedy of pollution hazards or contamination to the National Environment Board - To give opinions and recommendations to the National Environmental Board on proposed amendments to or improvement of any laws concerning the control, prevention, reduction or eradication of pollution - To propose incentive measures regarding taxation and private investment promotion in relation to pollution control, promotion and conservation of environmental quality to the National Environment Board - To recommend the National Environment Board on the determination of service fee rates for the central waste water treatment or central waste disposal services of the government - To give advice to the Minister on the setting of emission or effluent standards - To give advice to the Minister concerning the types of point sources of pollution - To make recommendations on the issuing of ministerial regulation specifying the types of categories of hazardous waste 	PCD/ MONRE	Interministerial body composed of representatives from: <ul style="list-style-type: none"> - MONRE - Min. of Interior - Min. of Transport - Min. of Industry - Min. of Public Health - Min. of Agriculture and Cooperatives - Bangkok Metropolitan Administration (BMA). 	Enhancement and Conservation of National Environmental Quality Act 1992 (B.E. 2535)

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
	<ul style="list-style-type: none"> - To coordinate government agencies, state enterprises and the private sector in their actions to control, prevent, mitigate or eradicate pollution - To prepare and submit the report on pollution situation to the National Environment board once a year - To consider and resolve on the challenge to the order of the pollution control official under the Act - To perform other functions designated by the Act or other related laws to be the authority and duty of the Pollution Control Committee - To carry out other matters assigned by the National Environment Board. 			
6.1.1 Basel Convention Subcommittee	<ul style="list-style-type: none"> - To determine and formulate the appropriate legal and technical measures for the implementation of the Basel Convention - To consider and arrange the ratification of the protocol and the amendments to the Basel Convention - To coordinate among governmental agencies and the private sector concerning all activities in accordance with the obligation of the Basel Convention - To perform other functions as assigned by the Pollution Control Committee 	PCD/ MONRE	Interministerial body composed of representatives from: <ul style="list-style-type: none"> - MONRE - Min. of Industry - Min. of Finance - Min. of Transport - Min. of Foreign Affairs - Min. of Commerce - Office of the Council of State. 	Enhancement and Conservation of National Environmental Quality Act 1992 (B.E. 2535)
6.2 National Coordinating Subcommittee for Stockholm Convention on Persistent Organic Pollutants	<ul style="list-style-type: none"> - To consider and give approval for ratification of Stockholm Convention on persistent organic pollutants (POPs) 	PCD/ MONRE	Interministerial body, chaired by the Honorable member of the National Environmental Board,	Enhancement and Conservation of National Environmental

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
	<ul style="list-style-type: none"> -To consider and supervise on the development of the national profile for POPs management - To consider and supervise on the development of the National Implementation Plan (NIP) for Stockholm Convention on POPs - To coordinate among governmental agencies and the private sector concerning all activities in accordance with the obligation of Stockholm Convention, and the collaboration with Secretariat of Stockholm Convention - To appoint ad-hoc working groups as appropriate - To perform other functions as assigned by the National Environment Board. 		composed of representatives from: <ul style="list-style-type: none"> - PCD - DIW - DOA - Department of Health - Customs Department - Department of International Organizations - Department of Treaties and Legal Affairs - Department of Foreign Trade - Department of Environmental Quality Promotion - FDA - Office of International Cooperation on Natural Resources and Environment - Department of Local Administration - BMA - Office of National Economic and Social Development Board - The Bureau of Budget - The Industrial Estate Authority of Thailand 	Quality Act 1992 (B.E. 2535)

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
			<ul style="list-style-type: none"> - The Federation of Thai Industry - one NGO representative - NIP project manager, a co-secretariat - 2 staff from PCD, co-secretariats. 	
<p>7. National Committee on Disaster Prevention</p>	<ul style="list-style-type: none"> - To develop policy and plan on disaster prevention to be considered by the Cabinet - To propose operation guideline and coordination mechanism for disaster prevention to the Cabinet - To monitor the progress of policy and plan implementation - To give comments on operations of all concerned organizations and related problems to the Cabinet - To propose for amendment or improvement of laws related to disaster prevention - To coordinate for related international assistance - To promote related training and workshops - To conduct public relations for raising awareness and understanding about disasters. 	<p>Department of Disaster Prevention and Mitigation/ Ministry of Interior</p>	<p>The committee chaired by the Prime Minister or an assigned Deputy Prime Minister, and composed of high-level representatives from 22 concerned agencies, 1 disaster mitigation association, 1 foundation under Royal Patronage and not more than 4 experts.</p>	<p>Rule of the Prime Minister Office on National Disaster Prevention 1995 (B.E.2538) and the amendments</p>
<p>III. Other mechanisms 1. The Thailand Research Fund (TRF)</p>	<p>-To support Chemical Safety Research Program by coordinating academic sector with government agencies in the cross cutting issues.</p>	<p>TRF</p>	<p>TRF research institutes, universities and governmental agencies concerned.</p>	<p>Improvement of efficiency in chemical management through research</p>

Table 7.A: Overview of Inter-ministerial Commissions and Coordinating Mechanisms (continued)

Name of Mechanism	Responsibilities	Secretariat	Members	Legislative Mandate/ Objective
2. Health Systems Research Institute (HSRI)	<p>- To support studies and research for building the body of knowledge with an aim to develop and transform national health in accordance with current socio-economic conditions</p>	HSRI	The HSRI committee chaired by Minister of Public Health and composed of high-ranking representatives of 8 concerned public organizations and 7 experts.	Health Systems Research Institute Act 1992 (B.E. 2535)
3. National Health Systems Reform Committee (NHSRC)	<p>- To formulate the National Health Act for guiding health system reform with all concerned, social and political support</p> <p>- To strengthen the civil society, interest groups and mass media for the sustainable success of health system reform</p> <p>- Related issues for health system reform include:</p> <ul style="list-style-type: none"> • Health promotion • Disease control and prevention • Health care and finance • Consumer protection 	Health Systems Reform Office (HSRO)	The committee chaired by the Prime Minister and composed of 17 high-level representatives from concerned agencies and 14 experts.	National Health Act (expected to be endorsed by the Parliament in 2005)
4. Thai Health Promotion Foundation (ThaiHealth)	<p>- To stimulate, advocate and provide funding to diverse organizations in Thai Society for health promotion strategies /activities on the Ottawa Charter. The source of ThaiHealth funding comes from a two percent of the national excise taxes on tobacco and alcohol (sin taxes), approximately over one thousand million Baht per year.</p> <p>- ThaiHealth issues of concern include:</p> <ul style="list-style-type: none"> • Health & Risk Reduction plan, e.g. Consumer protection • Learning for Well-being plan, e.g. Knowledge building and informal learning for Thai youth • Healthy Workplace plan, e.g. Improvement of healthy workplace in industries, educational institutions and government offices • Healthy Community plan, e.g. Province-, City, Community-base integrated development project. 	Office of ThaiHealth Promotion Foundation	ThaiHealth is operated under the Governing Board, chaired by the Prime Minister, and monitored by the Evaluation Board.	Health Promotion Foundation Act 2001 (B.E. 2544)

CHAPTER VIII

DATA ACCESS AND USE

Most chemical management activities in Thailand depend on the flow of information from various functional agencies responsible for the assessment and management of chemical life cycles, from their production, transport, storage, distribution, and use to their disposal. This involves many departments and requires various types of data. Such data include statistical data, research data, data from production enterprises, and international data. These constitute the fundamental information for chemicals management.

At present, the data available in Thailand cannot meet the need for managing chemicals at the community level, although the data are currently available. Some data, for instance, data concerning chemical impact assessment, risk assessment (environment/health), risk-reduction decisions, and accident preparedness/response, should be collected, sorted, and analysed by central organizations, to provide for clear and systematic use. It is important to note that while such information may often be collected for specific purposes, it is not generally available in a nationally uniform, consistent, and comparable fashion. As the focus of this chapter is on accessible national data, it will not discuss the potentially large range of data that is either not made available (for instance, constrained by confidentiality requirements), collected in an irregular and unreliable manner, or limited to specific geographical areas or times.

Table 8.A contributes an array of national data that may be required either under existing legal instruments or as supplementary data. It shows that information becomes generally less available (or generated less consistently) the further a chemical progresses along its lifecycle. Data from these stages include production statistics, import statistics, and transport accident reports. Such information generally is available to personnel within relevant government agencies, trade unions, and industry.

In the current era of globalisation, it has become necessary for national and regional information systems to be in contact with the rest of the world in order to be in real-time association with the global initiatives and current standards endorsed by the United Nations organizations and specialized institutes, such as ILO, UNEP, UNITAR, and WHO, as well as by other international bodies. Table 8.B and Table 8.C give information about available international literature and databases in Thailand, whether they are in printed or electronic form, and where these are located.

8.1 Location of National Data

Table 8. A: Location of National Data

* Data Source A = Analysis I = Informing from Public or Other Organizations M = Monitoring R = Research
 P = Permit O = Others S = Surveillance

Type of Data	Location (s)	Data Source *	Who Access		Data Access		Format	
			Staff	Public	By Request	Self Access	Printed	Web Site / Electronics
1. Production statistics	1. Department of Industrial Works	P	X		X		X	
	2. Food and Drug Administration	P	X	X		X	X	X
	3. Mahidol University, Faculty of Science	S, M	X			X	X	
	4. Organic Farming Network of Thailand	M	X	X		X	X	
	5. Port Authority of Thailand	O	X		X		X	
	6. Technology Promotion Association (Thailand - Japan)	I		X	X		X	
	7. Thailand Environment Institute	S	X					
	8. The Thailand Research Fund	R		X		X		X
2. Import Statistics	1. Department of Industrial Works	P	X		X		X	X
	2. Food and Drug Administration	I	X	X		X	X	X
	3. Mahidol University, Faculty of Science	S, M	X			X	X	
	4. Port Authority of Thailand	O	X		X		X	
	5. Regional Medical Science Center: Trang Province	I	X			X	X	
	6. The Customs Department	M	X	X		X		X
	7. Department of Industrial Works	P	X		X		X	X
	8. Food and Drug Administration	I	X	X		X	X	X
	9. Mahidol University, Faculty of Science	S, M	X			X	X	
	10. Port Authority of Thailand	O	X		X		X	
	11. Regional Medical Science Center: Trang Province	I	X			X	X	
	12. The Customs Department	M	X	X		X		X

Table 8. A: Location of National Data (continued)

Type of Data	Location (s)	Data Source *	Who Access		Data Access		Format	
			Staff	Public	By Request	Self Access	Printed	Web Site / Electronics
3. Export Statistics	1. Department of Industrial Works	P	X		X		X	X
	2. Food and Drug Administration	I	X	X		X	X	X
	3. Mahidol University, Faculty of Science	S, M	X			X	X	
	4. Port Authority of Thailand	O	X		X		X	
	5. The Customs Department	M	X	X		X		X
4. Industrial Accident	1. Bureau of Epidemiology	S, M, I		X	X	X	X	X
	2. Campaign for Alternative Industry Network/ Committee Toxic Chemical (CAIN / CTC)	M	X	X		X	X	
	3. National Institute of Health	I		X		X	X	X
	4. National Institute of the Improvement of Working Conditions and Environment (NICE)	A, I, M, S	X				X	
	5. Organic Farming Network of Thailand	M	X	X		X	X	
	6. Port Authority of Thailand	O	X		X		X	
	7. Technology Promotion Association (Thailand – Japan)	I		X	X		X	
	8. The Thailand Research Fund	R		X		X		X
5. Transport Accident Report	1. Bureau of Epidemiology	M,I		X	X		X	X
	2. CAIN / CTC	M	X	X		X	X	
	3. National Institute of Health	I		X		X		X
	4. The Thailand Research Fund	R		X		X		X
	5. Office of Permanent Secretary, Ministry of Transport	R, A, I, M,O	X	X	X	X	X	X
6. Occupational Health Data (Agricultural)	1. Alternative Agriculture Networks	S	X	X		X	X	
	2. Bureau of Epidemiology	S		X	X		X	
	3. NICE	I, O		X	X	X	X	
	4. National Institute of Health	S, M, A	X		X	X	X	X

Table 8. A: Location of National Data (continued)

Type of Data	Location (s)	Data Source *	Who Access		Data Access		Format	
			Staff	Public	By Request	Self Access	Printed	Web Site / Electronics
6. Occupational Health Data (Agricultural) (continued)	5. National Research Center for Environmental and Hazardous Waste Management (NRC-EHWM)	Purchasing	X	X	X		X	
	6. Organic Farming Network of Thailand							
	7. Regional Medical Science Center: Phisanuloke Province	S	X	X		X	X	X
	8. Regional Medical Science Center: Trang Province	Encyclopedia of Occupational Health		X		X	X	
	9. Regional Medical Science Center: Udonthani Province	A	X			X	X	
7. Occupational Health Data (Industrial)	1. Bureau of Epidemiology	S		X	X		X	X
	2. CAIN / CTC	M	X	X		X	X	
	3. Chulalongkorn University / Faculty of Engineering	A	X			X	X	
	4. Khonkaen University / Faculty of Engineering	M	X				X	
	5. Mahidol University, Faculty of Science	S, M	X			X	X	
	6. NICE	I, R	X	X	X		X	X
	7. National Institute of Health	I		X		X		X
	8. NRC-EHWM	Purchasing	X	X	X		X	
	9. Organic Farming Network of Thailand	M	X	X		X	X	
	10. Regional Medical Science Center: Phisanuloke Province	Encyclopedia of Occupational Health			X		X	

Table 8. A: Location of National Data (continued)

Type of Data	Location (s)	Data Source *	Who Access		Data Access		Format	
			Staff	Public	By Request	Self Access	Printed	Web Site / Electronics
7. Occupational Health Data (Industrial) (continued)	11. Technology Promotion Association (Thailand – Japan)	I		X	X		X	
8. Poisoning Statistics	1. Bureau of Epidemiology	S, M		X	X		X	
	2. Food and Drug Administration	M	X	X		X	X	X
	3. National Institute of Health	A	X		X		X	
	4. NRC-EHWM	Purchasing	X	X	X		X	
	5. Organic Farming Network of Thailand	M	X	X		X	X	
	6. Technology Promotion Association (Thailand – Japan)	I		X	X		X	
9. Pollutant Release and Transfer Register	1. CAIN / CTC	R	X	X		X	X	
	2. Organic Farming Network of Thailand	S	X	X		X	X	
10. Hazardous Waste Data	1. CAIN / CTC	M	X	X		X	X	
	2. Chulalongkorn University / Faculty of Engineering	A	X			X	X	
	3. Department of Health	I, R	X		X		X	
	4. Department of Industrial Works	P	X		X			X
	5. Khonkaen University / Faculty of Engineering	S		X		X	X	
	6. Mahidol University, Faculty of Science	S, M, A	X			X	X	
	7. NRC-EHWM	Purchasing	X	X	X		X	
	8. Organic Farming Network of Thailand	S	X	X		X	X	
	9. Regional Medical Science Center: Trang Province	I	X					X

Table 8. A: Location of National Data (continued)

Type of Data	Location (s)	Data Source *	Who Access		Data Access		Format	
			Staff	Public	By Request	Self Access	Printed	Web Site / Electronics
11. License / Permit of Pesticide	1. Food and Drug Administration	P	X	X		X	X	X
	2. Regional Medical Science Center: Trang Province	S	X				X	
	3. Office of Commodity and System Standard; National Bureau of Agricultural Commodity and Food Standard		x			x		x
12. License / Permit of Chemicals	1. Department of Industrial Works	P	X					X
	2. Food and Drug Administration	- Under FDA control	X	X		X	X	X
		- Permit for importation of 16 groups of pharmaceutical chemicals		X	X		X	X
	3. Office of the Narcotics Control Board	M,I	X	X			X	
4. Office of Commodity and System Standard; National Bureau of Agricultural Commodity and Food Standard		x			x		x	
13. Inventory of Existing Chemicals	1. Thammasat University / Faculty of Science and Technology	S	X			X	X	X
14. License / Permit of Importer	1. Department of Industrial Works	P	X		X			X
	2. Food and Drug Administration	Permit for Importer	X	X		X	X	X
15. License / Permit of Producers	1. Department of Industrial Works	P	X		X			X
	2. Food and Drug Administration	Permit for Producer	X	X		X	X	X
16. Prior Informed Consent (PIC) Decisions	1. Department of Agriculture	P	X		X		X	

Table 8. A: Location of National Data (continued)

Type of Data	Location (s)	Data Source *	Who Access		Data Access		Format	
			Staff	Public	By Request	Self Access	Printed	Web Site / Electronics
17. Environmental Health Data	1. Alternative Agriculture Networks	S	X	X		X	X	
	2. Bureau of Epidemiology	S, M, I		X	X		X	
	3. CAIN / CTC	M, R	X	X		X	X	
	4. Department of Agricultural Extension	S, A	X	X		X		X
	5. Department of Health	I, M, R	X	X	X	X	X	X
	6. Health Systems Research Institute	R	X	X	X		X	
	7. National Institute of Health	S, A, M	X	X	X	X	X	X
	8. NRC-EHWM	Purchasing	X	X	X		X	
	9. Organic Farming Network of Thailand	M	X	X		X	X	
	10. Regional Medical Science Center: Nakhon Sawan Province	From Website		X		X		X
	11. Regional Medical Science Center: Trang Province	R	X				X	X
	12. Sanitation and Health Impact Assessment, Department of Health	R		X		X	X	
	13. Technology Promotion Association (Thailand – Japan)	I		X	X		X	
18. Banned Chemicals	1. CAIN / CTC	M	X	X		X	X	
	2. Department of Industrial Works	HSA related agents conference				X	X	X
	3. Food and Drug Administration	Legistration	X	X		X	X	X
	4. Mahidol University, Faculty of Science	S, M	X			X	X	
	5. National Institue of Health	I	X			X	X	
	6. Organic Farming Network of Thailand	M	X	X		X	X	

Table 8. A: Location of National Data (continued)

Type of Data	Location (s)	Data Source *	Who Access		Data Access		Format	
			Staff	Public	By Request	Self Access	Printed	Web Site / Electronics
18. Banned Chemicals (continued)	7. Port Authority of Thailand	I	X		X		X	
	8. Regional Medical Science Center: Nakhon Sawan Province	From PCD		X		X		X
	9. Regional Medical Science Center: Udonthani Province		X		X			X
19. Reports on Safety and Risk Assessment of Hazardous Substances in Workplaces	1. CAIN / CTC	M	X	X		X	X	
	2. Institute for a Sustainable Agriculture Community	-		X	X		X	
	3. Mahidol University, Faculty of Science	S, M	X			X	X	
	4. National Research Center for Genetic Engineering and Biotechnology (BIOTEC)	S	X			X		X
	5. NICE	I	X				X	
	6. NRC-EHWM	Purchasing	X	X	X		X	
	7. Organic Farming Network of Thailand	M	X	X		X	X	
	8. Port Authority of Thailand	S	X				X	
	9. Regional Medical Science Center: Trang Province	R	X				X	
20. Others								
- Act and Related Regulation	1. The Thailand Research Fund	R		X		X		X
- Chemical danger data	1. The Thailand Research Fund	R		X		X		X
- Chemical Reference Data namely, CAS No., UN No., and Customs Tariff	1. The Thailand Research Fund	R		X		X		X
- Industrial Accident and Work, Related Injuries Statistics	1. NICE	Data Analysis from Related Agencies	X	X	X		X	X

Table 8. A: Location of National Data (continued)

Type of Data	Location (s)	Data Source *	Who Access		Data Access		Format	
			Staff	Public	By Request	Self Access	Printed	Web Site / Electronics
20. Others (continued) - MSDS, SG	1. The Thailand Research Fund	R		X		X		X
- Pesticide Problems Situation Areas Report	1. Health Systems Research Institute	R		X	X			X
- Risk Assessment of Hazardous Substances in Cosmetics and Household Product	1. Division of Cosmetics and Hazardous Substances / Department of Medical Science	S, A		X		X		X
- Statistic of Narcotic Substance	1. Food and Drug Administration	M	X	X		X	X	X
- The Chemicals Use of Farmers	1. Alternative Agriculture Networks	S	X	X		X	X	
- Toxicant Profile	1. Regional Medical Science Center: Chiangmai Province	Literature Review	X	X		X		X
- Toxicity of Chemical in Biological Products Division Laboratory (MSDS)	1. Division of Biological Laboratory / Department of Medical Science	Website	X			X	X	

Table 8.B manifests international literatures, which is available and provide practical information on how to access the data. Moreover, this table indicates the nature of national data related to chemicals management.

Table 8.B: Availability of International Literature

Literature	Locations	Format and How to Access			
		Printed		Electronics / Website	
		By Request	Self Access	By Request	Self Access
<ul style="list-style-type: none"> • WHO and Other International Organizations Documents 1. Environmental Health Criteria Document (WHO) 	1. Chulabhorn Research Institute	X			
	2. Department of Health	X			X
	3. Food and Drug Administration		X		X
	4. Institute of Health Research / Chulalongkorn University	X			
	5. Mahidol University, Faculty of Science	X			
	6. NICE	X			
	7. National Institute of Health				X
	8. Sanitation and Health Impact Assessment / Department of Health				X
2. Health and Safety Guides (WHO)	1. Chulabhorn Research Institute	X			
	2. Food and Drug Administration		X		X
	3. Institute of Health Research / Chulalongkorn University				X
	4. Mahidol University / Faculty of Science	X			
	5. Regional Medical Sciences Center: Ubonratchathanee Province	X			
	6. National Institute of Health				X

Table 8.B: Availability of International Literature (continued)

Literature	Locations	Format and How to Access			
		Printed		Electronics / Website	
		By Request	Self Access	By Request	Self Access
3. International Chemical Safety Cards (WHO / IPCS)	1. Food and Drug Administration		X		X
	2. Institute of Health Research / Chulalongkorn University	X			
	3. National Institute of Health		X		
	4. NICE	X		X	
	5. Regional Medical Science Center: Nakhon Sawan Province				X
4. WHO Food Additive Series	1. Food and Drug Administration		X		X
	2. National Institute of Health			X	
	3. Office of Commodity and System Standard; National Bureau of Agricultural Commodity and Food Standard		X		
5. Documents from the FAO/WHO Joint Meeting on Pesticide Residues	1. Food and Drug Administration		X		X
	2. Institute of Health Research / Chulalongkorn University	X			
	3. National Food Institute	X			
	4. National Institute of Health	X			
	5. Office of Commodity and System Standard; National Bureau of Agricultural Commodity and Food Standard		x		
6. Decision Guidance Documents for PIC Chemicals (FAO/UNEP)	1. National Institute of Health	X			
7. FAO/WHO Pesticides Safety Data Sheets	1. National Institute of Health	X			
8. International Maritime Goods Code (IMDG-Code)	1. Port Authority of Thailand				
9. PIC Decision Guidance Documents	1. Department of Agricultural	X			

Table 8.B: Availability of International Literature (continued)

Literature	Locations	Format and How to Access			
		Printed		Electronics / Website	
		By Request	Self Access	By Request	Self Access
10. Others					
- Code of Practice for the Safe Loading and Unloading of Bulk Carrier	1. Port Authority of Thailand				
- Guideline Concerning Chemical Safety in Port Area	1. Port Authority of Thailand				
- Guideline for Packing of Cargo Transport Unit	1. Port Authority of Thailand				
- ILO Conventions	1. NICE	X			
- ILO Encyclopedia of Occupational Health and Safety	1. Food and Drug Administration 2. NICE		X		
- Microgram (Dean Evans & Associate; DEA)	1. Office of the Narcotics Control Board				X www.dea.com
- Narcotic Drugs / Estimated World Requirement (United Nations International Narcotics Control Board; UN INCB)	1. Food and Drug Administration		X		X www.incb.org
- Precursors and Chemicals Frequently Used in Illicit Manufacture of Narcotic Drugs and Psychotropic Substances (UN INCB)	1. Food and Drug Administration		X		X www.incb.org
- Psychotropic Substances / Statistics: Assessment of Medical and Scientific Requirement (UN INCB)	1. Food and Drug Administration		X		X www.incb.org
- Recommendations on the Safe Transport of Dangerous Cargoes and Related Activities in Port Areas	1. Port Authority of Thailand				
- Safety of Life at Sea (SOLAS)	1. Port Authority of Thailand				
- UN-Recommendation on the Transport of Dangerous Goods	1. Port Authority of Thailand				
- WHO Basic Analytical Toxicology	1. Food and Drug Administration		X		
- WHO Drug Information	1. Food and Drug Administration		X		

Table 8.B: Availability of International Literature (continued)

Literature	Locations	Format and How to Access			
		Printed		Electronics / Website	
		By Request	Self Access	By Request	Self Access
- WHO Food Safety Department: Guidance for Establishing and Strengthening Prevention and Response System to Terrorist Threat to Food	1. Food and Drug Administration		X		
- WHO Guideline for Poison Control	1. Food and Drug Administration		X		
- WHO Handbook on Management of Poisoning for Health Care Worker	1. Food and Drug Administration		X		
- WHO Pharmaceutical Newsletter	1. Food and Drug Administration		X		
- The International Conference on Harmonization of Technical Requirements for Registration of Pharmaceuticals for Human Use (ICH)	1. Bureau of Drug and Narcotic / Department of Medical Science	X			X
- US FDA	1. Bureau of Drug and Narcotic / Department of Medical Science	X			
<ul style="list-style-type: none"> • Reference Method, Standard Method, Manual and Guideline 1. Analytical Methods for Pesticides and Plant Growth Regulators	1. National Institute of Health				
	2. Regional Medical Science Center: Nakhon Sawan Province		X		X
	3. Regional Medical Sciences Center: Udonthani Province	X			
2. Analytical Techniques for Food and Agricultural Products	1. National Institute of Health				
	2. Regional Medical Science Center: Nakhon Sawan Province		X		X
	3. Regional Medical Sciences Center: Udonthani Province	X			
3. Annual Book of ASTM Standards	1. General Environmental Conservation, Public Company Limited., (GENCO)		X		
	2. Mahidol University / Faculty of Science	X			
	3. National Institute of Health				
	4. NRC-EHWM				

Table 8.B: Availability of International Literature (continued)

Literature	Locations	Format and How to Access			
		Printed		Electronics / Website	
		By Request	Self Access	By Request	Self Access
3. Annual Book of ASTM Standards (continued)	5. Thammasat University / Faculty of Science and Technology		X		X
4. Good Laboratory Practice Principles	1. Bureau of Drug and Narcotic / Department of Medical Science				X
	2. Division of Biological Laboratory / Department of Medical Science				X
	3. Mahidol University / Faculty of Science	X			
	4. National Food Institute	X			
	5. National Institute of Health				
	6. Office of Commodity and System Standard; National Bureau of Agricultural Commodity and Food Standard		x		
	7. Regional Medical Science Center: Nakhon Sawan Province		X		
	8. Regional Medical Sciences Center: Trang Province		X		
	9. Regional Medical Sciences Center: Ubonratchathanee Province	X			
5. Manual of Chemical Methods for Pesticides and Devices, U.S. EPA	1. Division of Cosmetics and Hazardous Substances / Department of Medical Science		X		
	2. Regional Medical Sciences Center: Trang Province	X			
	3. Regional Medical Sciences Center: Udonthani Province		X		
6. Manual of Pesticide Residue Analysis	1. Mahidol University / Faculty of Science	X			
	2. National Food Institute	X			
	3. National Institute of Health				

Table 8.B: Availability of International Literature (continued)

Literature	Locations	Format and How to Access			
		Printed		Electronics / Website	
		By Request	Self Access	By Request	Self Access
6. Manual of Pesticide Residue Analysis (continued)	4. Office of Commodity and System Standard; National Bureau of Agricultural Commodity and Food Standard		X		
	5. Regional Medical Sciences Center: Trang Province	X			
	6. Regional Medical Sciences Center: Udonthani Province		X		
7. OECD Guidelines for the Testing of Chemicals	1. Chulabhorn Research Institute	X			
	2. Food and Drug Administration		X		
	3. Mahidol University / Faculty of Science	X			
	4. National Institute of Health				
8. Official and Standardized Methods Manual of Analysis	1. Regional Medical Science Center: Nakhon Sawan Province	X			
	2. Regional Medical Sciences Center: Trang Province				
	3. Thammasat University / Faculty of Science and Technology		X		
9. Official Methods of Analysis of AOAC	1. Division of Cosmetics and Hazardous Substances / Department of Medical Science		X		
	2. Food and Drug Administration		X		
	3. National Food Institute	X			
	4. Prince of Songkla University / Faculty of Engineering		X		
	5. Regional Medical Science Center: Nakhon Sawan Province		X		
	6. Regional Medical Sciences Center: Trang Province	X			
	7. Regional Medical Sciences Center: Ubonratchathanee	X			

Table 8.B: Availability of International Literature (continued)

Literature	Locations	Format and How to Access			
		Printed		Electronics / Website	
		By Request	Self Access	By Request	Self Access
9. Official Methods of Analysis of AOAC (continued)	8. Regional Medical Sciences Center: Udonthani Province		X		
10. Quality Assurance Principles for Analytical Laboratories (AOAC)	1. National Food Institute				
	2. Regional Medical Sciences Center: Trang Province	X			
	3. Regional Medical Sciences Center: Ubonratchathanee Province	X			
	4. Regional Medical Sciences Center: Udonthani Province		X		
11. Quality Assurance in Environmental Monitoring Instrumental Methods	1. National Food Institute				
	2. Prince of Songkla University / Faculty of Engineering		X		
12. Standard Methods for the Examination of Water and Waste Water (AWWA)	1. Division of Cosmetics and Hazardous Substances / Department of Medical Science		X		
	2. GENCO	X			
	3. Khonkaen University / Faculty of Engineering		X		
	4. National Food Institute	X			
	5. NRC-EHWM		X		
	6. Prince of Songkla University / Faculty of Engineering		X		
	7. Regional Medical Science Center: Nakhon Sawan Province		X		
	8. Regional Medical Sciences Center: Trang Province	X	X		
	9. Thammasat University / Faculty of Science and Technology		X		

Table 8.B: Availability of International Literature (continued)

Literature	Locations	Format and How to Access			
		Printed		Electronics / Website	
		By Request	Self Access	By Request	Self Access
13. Others					
- ACGIH Threshold Limit Value	1. NICE	X			
- British Pharmacopoeia	1. Food and Drug Administration		X		
- Compilation of EPA's Sampling and Analysis Method	1. NRC-EHWM		X		
- European Pharmacopoeia	1. Food and Drug Administration	X			
- Food Chemicals Codex (U.S Committee on Codex Specifications)	1. Food and Drug Administration	X			
- Handbook of Chemistry and Physics	1. NRC-EHWM		X		
- Handbook of Physical Properties of Organic Chemical	1. Food and Drug Administration		X		
- Japan Pharmacopoeia Reference	1. Food and Drug Administration	X			
- Martindale: The Complete Drug Reference	1. Food and Drug Administration		X		
- NIOSH Analytical Method	1. NICE		X		
- Pesticide Manual (British Crop Protection Council)	1. Food and Drug Administration		X		
- Thai Pharmacopoeia	1. Food and Drug Administration	X			
- The Cosmetics, Toiletry, and Fragrance Association (CTFA) 's Standard	1. Food and Drug Administration		X		
- UN, DEA	1. Office of the Narcotics Control Board	X			
- United States Pharmacopoeia	1. Food and Drug Administration	X			
- Wiley Guide to Chemical Incompatibilities	1. NRC-EHWM	X			

Table 8.C shows the international and local databases, which are accessibility within Thailand, including their location and format of the data.

Table 8.C: Available of International Databases

* Format C = Compact Disc

E = Electronic Files

O = Printed

M = Microfilm

O = Others

Database	Location (s)	Format *	How to Access	
			By Request	Self Access
1. International Registration of Potential Toxic Chemical (IRPTC)	1. Chulabhorn Research Institute	E	X	
2. International Programme on Chemical Safety (IPCS) INTOX	1. Department of Agricultural Extension	E		
	2. Food and Drug Administration	C, E		X
3. International Programme on Chemical Safety (IPCS) INCHEM	1. Department of Agricultural Extension	E		
	2. Food and Drug Administration	C, E		X
	3. Institute of Health Research / Chulalongkorn University	E	X	
	4. Regional Medical Sciences Center: Ubonratchathanee Province	P	X	
4. International Programme on Chemical Safety IPCS Chemical Safety	1. Department of Agricultural Extension	E		
	2. NICE	P	X	

Table 8.C: Available of International Databases (continued)

Database	Location (s)	Format *	How to Access	
			By Request	Self Access
5. Computer-Aided Management of Emergency Operations (CAMEO)	1. Department of Industrial Works	E		
	2. The Office of Disease Prevention and Control 9 th Phisanulok Province	C, E		X
6. Computerized Clinical Information Systems (CCIS)	3. Food and Drug Administration	C		X
7. TOMES Plus	1. Food and Drug Administration	C		X
8. Food and Drug Library Database	1. Regional Medical Sciences Center: Ubonratchathanee Province	P	X	
9. International Uniform Chemical Information Database (IUCLID) : Existing Chemicals (European Chemicals Bureau)	1. Food and Drug Administration	C		X
10. MEDLINE	1. Regional Medical Sciences Center: Trang Province	E		X
11. PubMed	1. Regional Medical Sciences Center: Trang Province	E		X
12. OSH-ROM				
13. CCINFO	1. NICE	C	X	
14. CAMEO APELL	1. Department of Industrial Works	E		X
15. CCOHS				
16. ESCAP Database on Pesticide and the Environment	1. Chulabhorn Research Institute	E	X	
	2. Institute of Health Research / Chulalongkorn University	E	X	
17. Drug Information Source	1. Regional Medical Sciences Center: Ubonratchathanee Province	P	X	
18. Others - Adverse Drug Reliant Databank - NIOSH, Pocket Guide to Chemical Hazardous	1. Food and Drug Administration	E	X	
	1. Institute of Health Research / Chulalongkorn University	E	X	

8.2 Comment and Analysis

Thailand has available completed chemical management information as described above. However, this collection of literature and databases probably is not widely used. There are many reasons for this. First, the data are produced by various authorities and at different levels of detail. A national standard for the compilation of chemical management data is not yet in existence. Moreover, every agency that works in relation to chemical management has its own literature or databases, and agencies do not share the information with others. Second, the data are owned and controlled by various departments, and the management technology is obsolete. It is therefore very inconvenient to use these data. Advanced management technology, i.e. special agency and computer network management, should be adopted to facilitate full and effective utilization of data so as to better serve the work of chemicals management. Third, most literature and databases can be directly accessed via the websites of government agencies. This requires that people who wish access to this information must have a computer and an Internet connection. In Thailand, people who live in rural areas lack the technology and I.T. infrastructure to obtain this information.

According to Thailand's constitution, everyone has the right to access government information. However, the most practical way of disseminating government information is not detailed in the constitution. Although chemical management data are available and national policy is open wide for public access, the public, including farmers and industrial workers, are not able to access and use all of the government data. The solution to this problem lies in the hands of each agency.

International literature and databases on chemicals safety management are available through such organisations as libraries in the major universities, government agencies, and through the Internet. Most government agencies in Thailand's National Profile of Chemicals Management Infrastructure place their own information on the Internet and provide links to other useful international sites. The Internet is augmented by a variety of other mechanisms. However, international literature and databases are purchased from abroad. So some international literature is obsolete, incomplete, or unsuitable to Thailand. Language is another problem significantly affecting the direct use of international literature because some information, such as material safety data sheets (MSDS) that is useful for labour does not translate into Thai or the translation has not been undertaken.

In order to establish a safe and sound society, we must urge the public to show more concern and interest in the use, transport, storage, and emission of chemical substances and their products. It is vital that the information be publicly available, since chemical management activities affect the public's quality of life.

CHAPTER IX

TECHNICAL INFRASTRUCTURE

9.1 Overview of Laboratory Infrastructure

Under the current legislations, many government agencies are mandated to deal with chemicals depending on the use categories and the resulting effects. Chemical laboratories supporting these responsibilities – registration, hazard monitoring, chemicals manipulation, litigation, import-export, risk assessment, control of new chemical substances, and so forth, can be classified as follows:

- 1) Agricultural sector, for controlling and regulating chemical substances used for agricultural purposes, such as fertilizers, pesticides, and plant growth regulators.
- 2) Public health sector, for controlling and regulating chemical substances in food, pharmaceuticals, and consumer and household products such as food additives, medicine, vaccines, cosmetics, pesticides and disinfectants. This includes analysis of narcotics for the suppression purpose.
- 3) Industrial sector, for various purposes, such as testing of raw materials, toxic substance and product quality; and checking for composition and quality of wastes generated or released from manufacturing plants.
- 4) Environmental sector, for investigating environmental impacts and monitoring environmental (water, soil and air) quality.

Most of the chemical laboratories are associated with the responsible ministries, of which some detail information is depicted in Table 9.A. Other laboratories can be found in universities, mostly for teaching and research activities although some are offering service to public. Table 9.B contains information of some university laboratories where their specialties are specified. A number of commercial laboratories offer their service in various areas but no information was received.

On the international scale, cooperation with other laboratories in the Southeast Asia region (ASEAN) has been established to carry out specific assignment, collaborative study, or special area of common interest, such as standard solution for pharmaceuticals (ASEAN reference standards) and chemical analysis expertise testing (proficiency testing schemes).

Table 9.A: Overview of Laboratory Infrastructure for Chemical Analysis in Responsible Ministries

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
<p>1. Ministry of Agriculture and Cooperatives</p> <ul style="list-style-type: none"> • Department of Agriculture • Land Development Department 	<ul style="list-style-type: none"> - Fertilizers - Pesticides 	<ul style="list-style-type: none"> - Regulation - Services (Certification for Import) 	<ul style="list-style-type: none"> - AAS-HS - GC/FID - UV-VIS 	<ul style="list-style-type: none"> - ISO/IEC 17025 (Partially) - OECD/GLP 	<p>--</p>
<p>2. Ministry of Public Health</p> <ul style="list-style-type: none"> • Department of Medical Science, Nonthaburi and • Regional Medical Sciences Center <ul style="list-style-type: none"> ➢ Central of Thailand <ul style="list-style-type: none"> - Nakhonsawan - Samut Songkhram ➢ Northern of Thailand <ul style="list-style-type: none"> - Chiang Mai - Chiang Rai - Phitsanulok 	<ul style="list-style-type: none"> - Foods and Beverages - Drugs - Narcotics - Biological Products (Vaccine) - Cosmetics - Household Chemicals - Disinfectants - Toxicology - Risk Assessment 	<ul style="list-style-type: none"> - Regulation - Surveillance - Health Impact - R & D - Import and Export 	<ul style="list-style-type: none"> - FAAS - AAS-HS, GFAAS - GC/ECD, GC/FID, GC/FPD, GC/NPD, GC/MS, GC/MSD, GC/TEA - IC - HPLC, HPLC/PDA, LC/MS, LC/MS/MS - NMR, FTIR, IR - UV-VIS - PCR, Real time 	<ul style="list-style-type: none"> - ISO/IEC 17025 - ISO 15189 - OECD-GLP 	<ul style="list-style-type: none"> - NATA, Australia (Division of Cosmetics and Hazardous Substances) - BLQS, Thailand (In process for every division and regional centers)

Table 9.A: Overview of Laboratory Infrastructure for Chemical Analysis in Responsible Ministries (continued)

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
<p>2. Ministry of Public Health (cont)</p> <ul style="list-style-type: none"> • Regional Medical Sciences Center (continued) <ul style="list-style-type: none"> ➢ Northeastern of Thailand <ul style="list-style-type: none"> - Nakorn Ratchasima - Khon Kaen - Ubol Ratchathani - Udonthani ➢ Eastern of Thailand <ul style="list-style-type: none"> - Chonburi ➢ Southern of Thailand <ul style="list-style-type: none"> - Songkhla - Trang - Suratthani - Phuket 					

Table 9.A: Overview of Laboratory Infrastructure for Chemical Analysis in Responsible Ministries (continued)

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
2. Ministry of Public Health <ul style="list-style-type: none"> • Department of Health - Research and Laboratory Development Center 	<ul style="list-style-type: none"> - Environment 	<ul style="list-style-type: none"> - R & D - Services 	<ul style="list-style-type: none"> - FAAS, GFAAS - GC/ECD, GC/FID, GC/FPD - HPLC - IC - UV-VIS - Hg Analyzer - TCP OES 	<ul style="list-style-type: none"> - ISO/IEC 17025 	<p>--</p>
3. Ministry of Industry <ul style="list-style-type: none"> • Department of Industrial Works 	<ul style="list-style-type: none"> - Environment 	<ul style="list-style-type: none"> - Regulation 	<ul style="list-style-type: none"> - FAAS, AAS-HS, GF-AAS - GC/FID, GC/FPD - IC - UV-VIS 	<ul style="list-style-type: none"> - ISO/IEC 17025 	<ul style="list-style-type: none"> - In progress for accreditation

Table 9.A: Overview of Laboratory Infrastructure for Chemical Analysis in Responsible Ministries (continued)

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
<p>4. Ministry of Science and Technology</p> <ul style="list-style-type: none"> • Department of Science Service - Chemical Division 	<ul style="list-style-type: none"> - Fertilizer - Household Chemicals - Trace Elements 	<ul style="list-style-type: none"> - Services for Certification and Calibration 	<ul style="list-style-type: none"> - FAAS, AAS-HS, GFAAS - ICP/AES - GC/EDC, GC/FID, GC/FPD, GC/NPD, GC/TCD, GC/MS - HPLC, HPLC/PDA - IC - IR, FTIR - NMR - UV-VIS - X-ray fluorescence spectrometer 	<ul style="list-style-type: none"> - ISO/IEC 17025 (partially) - AWWA, ASTM, EPA, JIS, DIN, TAPPI 	<ul style="list-style-type: none"> - TISI --

Table 9.A: Overview of Laboratory Infrastructure for Chemical Analysis in Responsible Ministries (continued)

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
<ul style="list-style-type: none"> • National Science and Technology Development Agency - National Centre for Genetic Engineering and Biotechnology (BIOTEC) - National Metal and Material Technology Center (MTEC) 	<ul style="list-style-type: none"> - Drugs - Environment - Fertilizers - Foods & Beverages - Metal & Materials 	<ul style="list-style-type: none"> - R & D - Health Impact - Training - Consultant 	<ul style="list-style-type: none"> - GC/FIC, GC/TCD, GC/MS/MS - AAS-HS - ICP/AES - HPLC, HPLC/PDA - IC - LC/MS - IR, NMR - Real time PCR - UV-VIS 	<ul style="list-style-type: none"> - ISO/IEC 17025 (partially) - ISO 14001 (partially) - ISO 18001 (partially) 	<ul style="list-style-type: none"> -- -- --

Table 9.B: Overview of Laboratory Infrastructure for Chemical Analysis in Universities

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
<p>1. Chulalongkorn University</p> <ul style="list-style-type: none"> • National Research Center for Environmental and Hazardous Waste Management • Environmental Research Institute 	<ul style="list-style-type: none"> - Environment - Pesticides - Heavy metals - Environment - Pesticides 	<ul style="list-style-type: none"> - R & D - Teaching - R & D - Service: water quality analysis 	<ul style="list-style-type: none"> - AAS-HS - ICP/AES - GC/ECD, GC/FID, GC/NPD, GC/TCD, GC/MS - HPLC - IC - FAAS, ASS-HS, GFAAS - GC/ECD, GC/FID - UV-VIS - TOC - Hg Analyzer 	<p>--</p> <p>- ISOIEC 17025 (partially)</p>	<p>--</p> <p>--</p>

Table 9.B: Overview of Laboratory Infrastructure for Chemical Analysis in Universities (continued)

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
1. Chulalongkorn University (cont) <ul style="list-style-type: none"> • Institute of Health Research 	<ul style="list-style-type: none"> - Health - Drugs - Toxicology - Narcotics - Pesticides 	<ul style="list-style-type: none"> - R & D 	<ul style="list-style-type: none"> - AAS-HS - GC/FID, GC/NPD GC/MS, C/MS/MS - HPLC, UV-VIS - FTIR - PCR, Real time PCR 	<ul style="list-style-type: none"> - OECD/GLP (partially) 	<p style="text-align: center;">--</p>
<ul style="list-style-type: none"> • Faculty of Engineering - Department of Environmental Engineering 	<ul style="list-style-type: none"> - Environment 	<ul style="list-style-type: none"> - R & D - Services: analysis of water and wastewater 	<ul style="list-style-type: none"> - FAAS - AAS-HS - ICP/MS - GC/MS - IC - UV-VIS 	<ul style="list-style-type: none"> - ISO/IEC 17025 (partially) 	<p style="text-align: center;">--</p>
2. Kasetsart University <ul style="list-style-type: none"> • Department of Chemical Engineering 	<ul style="list-style-type: none"> - Health - Environment 	<ul style="list-style-type: none"> - R & D - Teaching 	<ul style="list-style-type: none"> - FAAS - GC/FID, GC/TCD - HPLC - UV-VIS 	<p style="text-align: center;">--</p>	<p style="text-align: center;">--</p>

Table 9.B: Overview of Laboratory Infrastructure for Chemical Analysis in Universities (continued)

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
3. Khon Kaen University (cont) <ul style="list-style-type: none"> • Faculty of Engineering 	<ul style="list-style-type: none"> - Environmental - Pesticide 	<ul style="list-style-type: none"> - Teaching - Services: environmental quality analysis 	<ul style="list-style-type: none"> - FAAS, GFAAS, ICP/AES - GC/ECD, GC/FID, GC/MS - HPLC, IC - UV-VIS, XRD 	<ul style="list-style-type: none"> - ISO/IEC 17025 	<p>--</p>
4. Mahidol University <ul style="list-style-type: none"> • Faculty of Science - Department of Chemistry 	<ul style="list-style-type: none"> - Environment - Food & Beverages - Pesticides - Trace Element - Chemical Test Unit 	<ul style="list-style-type: none"> - R & D - Service 	<ul style="list-style-type: none"> - FAAS, AAS-HS, GFAAS, ICP/AES, ICP/MS - GC/ECD, GC/FID, GC/FPD, GC/TCD, GC/MS - HPLC, HPLC/PDA, LC/MS - IR, FTIR, NMR - UV-VIS - CHN Analyzer, - XRD, XRF, TGA, DSC 		

Table 9.B: Overview of Laboratory Infrastructure for Chemical Analysis in Universities (continued)

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
4. Mahidol University (cont) <ul style="list-style-type: none"> • Central Instrument Facility 	<ul style="list-style-type: none"> - Drugs - Environment - Foods & Beverages 	<ul style="list-style-type: none"> - R & D 	<ul style="list-style-type: none"> - FAAS, GFAAS - GC/ECD, GC/FID, GC/NPD, GC/TCD, GC/MSD - HPLC, HPLC/PDA, HPLC/ECD - LC/MS/MS - UV-VIS - FPLC 	<ul style="list-style-type: none"> - ISO/IEC 17025 (partially) 	<p>--</p>
5. Prince of Songkla University <ul style="list-style-type: none"> • Faculty of Engineering 	<ul style="list-style-type: none"> - Environment 	<ul style="list-style-type: none"> - R & D - Regulation - Consultant - Training 		<ul style="list-style-type: none"> - ISO/IEC 17025 (partially) - OECD/GLP (partially) 	<p>--</p>

Table 9.B: Overview of Laboratory Infrastructure for Chemical Analysis in Universities (continued)

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
6. Thammasat University <ul style="list-style-type: none"> • Department of Chemistry 	<ul style="list-style-type: none"> - Chemical 	<ul style="list-style-type: none"> - R & D 	<ul style="list-style-type: none"> - FAAS, AAS-HS, GFAAS - HPLC - FTIR, NMR - UV-VIS 	<p style="text-align: center;">--</p>	<p style="text-align: center;">--</p>
<ul style="list-style-type: none"> • Department of Biotechnology 	<ul style="list-style-type: none"> - Biochemistry - Industrial Biotech 	<ul style="list-style-type: none"> - R & D - Teaching 	<ul style="list-style-type: none"> - GC/FID - HPLC, HPLC/PDA - PCR, Real time PCR - UV-VIS 	<p style="text-align: center;">--</p>	<p style="text-align: center;">--</p>
<ul style="list-style-type: none"> • Faculty of Engineering 	<ul style="list-style-type: none"> - Environmental - Pesticide 	<ul style="list-style-type: none"> - Teaching - Services: environmental quality analysis 	<ul style="list-style-type: none"> - FAAS, GFAAS, ICP/AES - GC/ECD, GC/FID, GC/MS - HPLC - IC - UV-VIS - XRD 	<ul style="list-style-type: none"> - ISO/IEC 17025 	<p style="text-align: center;">--</p>

Table 9.C: Overview of Laboratory Infrastructure for Chemical Analysis in Private Organizations

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
1. Thai Automotive Institute	- Automotive parts	- R&D - Regulation - Service		- ISO/IEC 17025	- TISI
2. The Federation of Thai Industries • The Industrial Environment Institute	- Chemical	- Service for Water & Waste Water Analysis		- ISO/IEC 17025 (partially)	--
3. Electricity Generating Authority of Thailand - Chemical Laboratory Division	- Environment - Petroleum	- Chemical - Petroleum	- FAAS, AAS-HS, GFAAS - ICP/AES - IC - FTIR - UV-VIS - TOC	- ISO/IEC 17025 - DIW Standard	- TISI - DIW

Table 9.C: Overview of Laboratory Infrastructure for Chemical Analysis in Private Organizations (Continued)

Name / Description	Scope	Purpose	Equipment	Laboratory Quality System	Accreditation Body
4. Electrical and Electronics Institute	- Chemical	- Service: Test Metal in Toys	- ICP/MS - GC/MSD - UV-VIS - X-ray	- ISO/IEC 17025	--
5. GENCO	- Chemical	- Regulation; Monitoring - Services	- AAS-HS - ICP/AES - UV-VIS	- ISO/IEC 17025 (Partially)	--
6. Technology Promotion Association (Thailand – Japan)	- Chemical	- Service - Training	- FAAS - GC/FID - HLPC - UV-VIS	- ISO/IEC 17025 - OECD/GLP (Partially) - DIW standard	- TISI -- - DIW

9.2 Overview of Technical Training and Education Programmes

Science, technology and engineering related education at all levels - schools, vocational colleges, and universities - uses a lot of chemical substances for teaching and research. Common and sophisticated scientific equipment are available in most universities, especially in the outstanding research units and centres of excellence. Some units offer their analytical service for auditing and certification of product quality and many other purposes needed by industries.

However, the awareness of chemical safety is still in its infancy. Attempts were undertaken by five leading universities of the country with support from the Thailand Research Fund to set up a model for chemical and hazardous substance management in university. A software called CHEMTRACK was developed to administer flow of chemicals and costing, packaged with material safety data sheets in Thai for local use. Green chemistry concept has been adapted and gradually incorporated into the curriculum.

Training of proper use of equipment and special analytical techniques are periodically organized as workshops, seminars, and conferences by relevant agencies and/or by the chemical or equipment companies. New ideas and findings can be learned and gathered from special workshops and international conferences, e.g. the international conference of the Association of Analytical Communities (AOAC), CODEX, and ISO Standards.

9.3 Comments / Analysis

Although not fully certified, most laboratories in Thailand apply the international standards for laboratory quality management system, such as

- ISO/IEC 17025: General Requirements for the Competence of Calibration and Testing Laboratories
- ISO 15189: Medical Laboratories – Particular Requirements for Quality and Competence
- OECD - GLP: Good Laboratory Practice

At present, these laboratories are in the preparatory stage for the certification which can be obtained from 2 accreditation bodies, namely

- 1) Thai Industrial Standards Institute (TISI): accreditation for industrial testing and calibration laboratory and environmental laboratory, according to ISO/IEC 17025 standard.
- 2) Bureau of Laboratory Quality Standard (BLQS): accreditation for health laboratory, according to ISO/IEC 17025, ISO 15189, and good laboratory practice standard.

TISI and BLQS are the full members of Asia-Pacific Laboratory Accreditation Cooperation (APLAC) and International Laboratory Accreditation Cooperation (ILAC). This implies that any laboratory accredited by any of the two organisations can make use of their logos worldwide for the recognition of the certification.

There is increasing demand of analytical service from laboratories of GLP standard in response to the requirement of various international measure and directive. The accuracy and reliability of analysis may require upgrading of facilities and equipment including additional capacity building. At present, there are still challenges in the areas of internal quality control, inter-laboratory calibration, analytical benchmarking, proficiency testing schemes and external quality assessment. Chemical Laboratories in Thailand are mainly located in Bangkok, at the governmental central agencies which are chiefly responsible for the assigned jobs. With the constraint of the availability of sophisticated equipment, a cooperative network of the existing laboratories and the concept of facility sharing may be needed especially for assignments in the area where there is no supporting regional laboratory.

Chapter X

International Linkage

10.1 Cooperation/Involvement with International Organizations, Bodies and Agreements and Participation in Relevant Technical Assistance Projects

With the increase in attention paid to chemical management at the international level, Thailand has developed strong partnerships with international organizations, in order to address the challenges posed by chemicals. Furthermore, Thailand has actively engaged in the IFCS, a global coordinating mechanism that takes governments, IGOs and NGOs on board to consolidate international efforts for chemical safety. As a result, the development of national policy framework and the implementation in line with the IFCS recommendations has been fostered in the country. The interest and commitment of Thailand has been carried on towards the development of SAICM.

Thailand has ratified and implemented the Vienna Convention & Montreal Protocol, the Basel Convention, the Rotterdam Convention, the UN Convention against illicit traffic in narcotic drugs & psychotropic substances, and the Stockholm Convention (as of October 2005). In addition, Thailand voluntarily supports other chemical-related international agreements and code of conduct to ensure sound management of chemicals.

Table 10.A provides the information about the nation fellowships in international organizations, programs and bodies, including corresponding focal points, participating agencies and their activities. Table 10.B describes Thai participation in conventions and international agreements. Table 10.C depicts technical assistance projects undertaken by various organizations in Thailand to promote chemical safety at national, regional and global level.



Table 10.A : Membership in International Organizations, Programs and Bodies

International Organization / Body / Activity	National Focal Point (Ministry / Agency & Primary Contact Point)	Other Ministries / Agencies Involved	Related National Activities
International Forum on Chemical Safety (IFCS)	Ministry of Public Health (MOPH)/Food and Drug Administration (FDA) Director, Chemical Safety Group IFCS National Focal Point Tiwanon Rd., Nonthaburi 11000, Thailand Tel : (662) 590 7021, 590 7286, 590 7289 Fax : (662) 590 7287 E-mail : forum4@health.moph.go.th	Members of the National Coordinating Committee on Chemical Safety (refer to Chapter 7)	<ul style="list-style-type: none"> - Formulating Thailand's National Master Plan (NMP) on Chemical Management - Developing National Chemicals Management Profile - Setting National Priority for Chemical Management - Facilitating the establishment of National Information Network on Chemical Safety - Monitoring and evaluating the success of National Master Plan on Chemical Management - Hosting IFCS Forum IV, 2003, Bangkok, Thailand - Administratively and technically supporting Thai Presidency of IFCS during 2004-2006 - Working in collaboration with IFCS and other IGOs and NGOs as Secretariat body of all Thai IFCS' activities.
International Program on Chemical Safety (IPCS)	same as for IFCS	same as for IFCS	<ul style="list-style-type: none"> - Facilitating the establishment of Poison Center Network - Publishing Thai Newsletter on Chemical Safety - Working in collaboration with IPCS and other IGOs and NGOs as Secretariat body of all Thai IPCS' activities.

Table 10.A: Membership in International Organizations, Programs and Bodies (continued)

International Organization / Body / Activity	National Focal Point (Ministry/Agency & Primary Contact Point)	Other Ministries / Agencies Involved	Related National Activities
World Health Organization (WHO)	MOPH / WR to Thailand WR office Office of the Permanent Secretary for Public Health Tiwanon Rd. Nonthaburi 11000 Thailand Tel : (662) 591 8198, 590 1513-4, 590 1505-7, 590 1524 Fax : (662) 591 8199 Email : whothai@health.moph.go.th	All relevant, e.g. academic and other concerned institutions	Provide assistances in the following technical areas and consultants (2004 – 2005) 1. Communicable Diseases Surveillance 2. Health Promotion and Non-communicable Diseases 3. Health System 4. Technical cooperation among countries.
Food and Agriculture Organization of The United Nations (FAO)	Ministry of Agriculture and Cooperatives (MOAC)/Department of Agriculture (DOA as Designated National Authority – DNA)	All relevant, e.g. academic and other concerned institutions	1. International Code of Conduct on the Distribution and Use of Pesticides 2. Obsolete Pesticides 3. Pesticide Identification, Classification and Labeling.
	MOAC/DOA		Preparing and requesting for “Assistance on Harmonization of Pesticides Registration among ASEAN Countries”.
	MOAC/DOA (on behalf of Chairperson)		Preparing and requesting for “Establishment of Harmonization of ASEAN MRLs among Member Countries”.

Table 10.A: Membership in International Organizations, Programs and Bodies (continued)

International Organization / Body / Activity	National Focal Point (Ministry/Agency & Primary Contact Point)	Other Ministries / Agencies Involved	Related National Activities
International Labour Organization (ILO)	Ministry of Labour Department of Labor Protection and Welfare Director, National Institute of the Improvement of Working Conditions and Environment 22/3 Baromrajchachonnee Rd. Talingchan, Bangkok 10170 Thailand Tel : (662) 884 1727, 448 6608 Fax : (662) 448 6509 E-mail : info_nice@thai.com	All relevant, e.g. academic and other concerned institutions	<ul style="list-style-type: none"> - Convening meetings concerning safety in the use of chemicals at work - Formulating National Master Plan on the Safety in Occupational Health and Environment - Putting into practice the Recommendation concerning the List of Occupational Diseases and the Recording and Notification of Occupational Accidents and Diseases (ILO 194) - Preparation for the ratification on the Recommendation concerning the Improvement of Standards in Merchant Ships (ILO 155).
UN International Narcotics Control Board (INCB)	Ministry of Justice (MOJ)/Office of the Narcotics Control Board (ONCB) 5 Din Daeng Road, Phyathai District Bangkok 10400, Thailand Tel : (662) 245 5280 Fax : (662) 245 5280 , 246 8526 Telex : 72050 NACOBOD TH E-mail : leb@oncb.go.th	Food and Drug Administration/Ministry of Public Health Customs Department/Ministry of Finance Narcotic Suppression Bureau/Royal Thai Police Department of Industrial Works/Ministry of Industry	<ol style="list-style-type: none"> 1. Control all substances or chemicals and precursors, which could be part of narcotic productions. Control abuse of drug and substitution-drug through suppression and interception of smuggling drugs from abroad by focusing major drug trafficking. 2. Keep drug addicts away from drug chain by using all appropriate means of treatment and rehabilitation to the particular groups. Available military camps and government units that have potential to turn to be drug treatment centers must be utilized.

Table 10.A: Membership in International Organizations, Programs and Bodies (continued)

International Organization / Body / Activity	National Focal Point (Ministry/Agency & Primary Contact Point)	Other Ministries / Agencies Involved	Related National Activities
UN International Narcotics Control Board (INCB) (continued)			<p>All concerned laws and legislation will be amended and enacted in order to facilitate the above mentioned measures, accordingly.</p> <p>3. Prevent drug abuse by invoking public awareness on “Strength of the Nation” to overcome drugs. Target villages will be assigned. Villages/communities will be strengthened, morale will be raised, and public relations will be intensively campaigned. Moreover, the promotion of alternative activities, preventive education among the youth, and harm reduction approaches will be complied in order to reach those target groups.</p>
<p>United Nations Environment Programme (UNEP) International Register of Potentially Toxic Chemicals (IRPTC)/UNEP National Correspondent</p> <p>Strategic Approach to International Chemicals Management (SAICM)</p>	<p>Ministry of Natural Resources and Environment (MONRE)/Pollution Control Department (PCD) Director, Waste and Hazardous Substance Management Bureau 92 Soi Phahon Yothin 7 Phahon Yothin Road Sam Sen Nai, Phayathai District Bangkok 10400 Thailand. Tel : (662) 298 2422 Fax : (662) 298 2425</p>	<p>Members of the National Environment Board (refer to Chapter 7)</p>	<ol style="list-style-type: none"> 1. Publication of chemical information, e.g. the Hazardous Substances News, and chemical monographs 2. Running a query response service to provide information to government agencies, private enterprises, universities, research institutes and non-governmental organizations 3. Secretariat of all NRPTC and IRPTC activities.

Table 10.A: Membership in International Organizations, Programs and Bodies (continued)

International Organization / Body / Activity	National Focal Point (Ministry/Agency & Primary Contact Point)	Other Ministries / Agencies Involved	Related National Activities
UNEP (continued)		Chulabhorn Research Institute (CRI) has been designated as UNEP Center of Excellence for Environmental and Industrial Toxicology	<ol style="list-style-type: none"> 1. Publication of CRI / ICEIT Newsletter on awareness problems caused by chemicals 2. Training courses on Environmental and Industrial Toxicology 3. Research on Environmental Toxicology, Industrial Toxicology and Technology.
United Nations Industrial Development Organization (UNIDO)	Office of Industrial Economics Ministry of Industry Director, International Industrial Economics Division, Rama VI Road, Bangkok 10400, Thailand Tel : (662) 202 4334-6, 202 4307-8 Fax : (662) 664 8951		Provide assistances related to chemical management as follows; <ol style="list-style-type: none"> 1. Establishment of a Regional Dioxin Laboratory in Thailand 2. Demonstration Project on the alternatives to the use of Methyl Bromide.
United Nations Institute for Training and Research (UNITAR)			<ol style="list-style-type: none"> 1. Development of Thailand National Chemicals Management Profile 2. Capacity building projects on GHS and etc.
IE/PAC Cleaner Production Center	Industrial and Environmental Program Activities Center under UNEP		
World Bank	The Fiscal Policy Office Ministry of Finance Rama VI Road, Bangkok, Thailand Tel : (662) 273 9020 Fax : (662) 273 9168		

Table 10.A: Membership in International Organizations, Programs and Bodies (continued)

International Organization / Body / Activity	National Focal Point (Ministry/Agency & Primary Contact Point)	Other Ministries / Agencies Involved	Related National Activities
ASEAN Consultative Committee for Standards and Quality (ACCSQ) Herbal Medicine and Health Supplement Product Working Group	Ministry of Public Health (MOPH) / Food and Drug Administration (FDA) Drug Control Division Tiwanon Rd, Nonthaburi 11000 Thailand E-mail : drug@fda.moph.go.th		– Harmonization of the Herbal Medicine and Health Supplement Standards of ASEAN member countries.
ASEAN Consultative Committee for Standards and Quality (ACCSQ) Medical Device Product Working Group	Ministry of Public Health (MOPH) / Food and Drug Administration (FDA) Medical Device Control Division Tiwanon Rd., Nonthaburi 11000 Thailand Tel. (662) 590 7148 Fax. (662) 591 8445 E-mail : medical@fda.moph.go.th		– Harmonization of the Medical Device Standards of ASEAN member countries.
ASEAN Harmonized Working Party on Medical Device	Ministry of Public Health (MOPH) / Food and Drug Administration (FDA) Medical Device Control Division Tiwanon Rd., Nonthaburi 11000 Thailand Tel. (662) 590 7243 Fax. (662) 591 8480 E-mail : medical@fda.moph.go.th		

Table 10.A: Membership in International Organizations, Programs and Bodies (continued)

International Organization / Body / Activity	National Focal Point (Ministry/Agency & Primary Contact Point)	Other Ministries / Agencies Involved	Related National Activities
ASEAN Consultative Committee for Standards and Quality (ACCSQ) Pharmaceutical Product Working Group	Ministry of Public Health (MOPH) / Food and Drug Administration (FDA) Drug Control Division Tiwanon Rd., Nonthaburi 11000 Thailand Tel. (662) 590 7061 Fax. (662) 590 7167 E-mail : drug@fda.moph.go.th	Department of Medical Sciences/Ministry of Public Health	<ul style="list-style-type: none"> - Harmonization of the Pharmaceutical Registration Requirement of ASEAN member countries. - Mutual Recognition Arrangement (MRA) on Pharmaceuticals.
ASEAN Consultative Committee for Standards and Quality (ACCSQ) Prepared Food Stuffs Working Group	National Bureau of Agricultural Commodity and Food Standards Ratchadamnoen Nok Road, Phranakorn, Bangkok 10200 Phone (662) 629 8970	Food and Drug Administration/Ministry of Public Health	<ul style="list-style-type: none"> - Harmonization of the Prepared Foodstuffs Standards of ASEAN member countries.
ASEAN Cosmetic Committee	Ministry of Public Health (MOPH) / Food and Drug Administration (FDA) Cosmetic Control Group, Bureau of Cosmetic and Hazardous Substances Control, Tiwanon Rd., Nonthaburi 11000 Thailand Tel. (662) 590 7272 Fax. (662) 591 8468 E-mai: cosmetic@fda.moph.go.th	Department of Medical Sciences / Ministry of Public Health Thai Industrial Standards Institute / Ministry of Industry Department of Trade Negotiation / Ministry of Commerce Thai Federation of Industries Thai Cosmetic Manufacturers Association Thai Cosmetics Association Association of Cosmetic Chemists of Thailand Cosmetic Industry Association Thai soap, detergents and personal care manufacturers association	<ul style="list-style-type: none"> - Harmonization of the Cosmetic Regulation of ASEAN member countries.

Table 10.A: Membership in International Organizations, Programs and Bodies (continued)

International Organization / Body / Activity	National Focal Point (Ministry/Agency & Primary Contact Point)	Other Ministries / Agencies Involved	Related National Activities
ASEAN Occupational Safety and Health Network (ASEAN-OSHNET)	Ministry of Labour / Department of Labour Protection and Welfare Director, National Institute for the Improvement of Working Conditions and Environment (NICE) 22/22 Baromrachachonnanee Rd., Thaling chan, Bangkok 10170, Thailand Tel./Fax. (662) 448 9171 E-mai: info_nice@thai.com		<ul style="list-style-type: none"> - Corporate member of ASEAN countries on OSH activities in five areas <ul style="list-style-type: none"> - Research - Standard / regulation - Training - Information - Labour inspection - Programme Area Coordinator on OSH Information.
Asia-Pacific Economic Cooperation – Life Science Innovation Forum (APEC – LSIF)	Ministry of Public Health (MOPH) / Department of Medical Sciences(DMSc) Tiwanon Rd., Nonthaburi 11000 Thailand	Food and Drug Administration/ Ministry of Public Health	<ul style="list-style-type: none"> - Harmonization initiative/cooperation for capital development/innovation to address the early detection & prevention of diseases in the region, and etc.

Table 10.B: Participation in International Agreements/Procedures Related to Chemical Management

International Agreement	Primary Responsible Agency	Relevant National Implementation Activities
Agenda 21-Commission for Sustainable Development	Ministry of Natural Resources and Environment (MONRE)/ Office of Environmental Policy and Planning	<ol style="list-style-type: none"> 1. UNCED report was approved by the cabinet since 15 September 1992, the national environment committee assumes the rule and responsibility for sustainable development as agreed by, and in accordance with the UNCED. 2. There are three subcommittees undertaking the tasks: Convention on Global Climate Change subcommittee, Convention on Biological Diversity subcommittee, and The Action Plan on Agenda 21 subcommittee.
Basel Convention on the Control of Transboundary Movements of Hazardous Wastes	Ministry of Natural Resources and Environment (MONRE)/ Pollution Control Department (PCD – Focal Point) Ministry of Industry (MOI)/ Department of Industrial Works (DIW – Competent Authority)	<ul style="list-style-type: none"> – Establishing the Subcommittee for Basel Convention – Designating the Competent Authority and National Focal Point for Basel Convention – Endorsing the Ministerial Notification on the Listing of the Hazardous Waste governed by the Basel Convention.
Codex Alimentarius (The International Food Standard Code)	National Bureau of Agricultural Commodity and Food Standards Ratchadamnoen Nok Road, Phranakorn, Bangkok 10200 Phone 66 2629 8970	
Convention on the Prevention of Marine Pollution by Dumping of Wastes and Other Matter (London Convention)	Ministry of Industry	

Table 10.B : Participation in International Agreements/Procedures Related to Chemical Management (continued)

International Agreement	Primary Responsible Agency	Relevant National Implementation Activities
Convention on the Prohibition of the Development, Production, Stockpiling and Use of Chemical Weapons and on Their Destruction (Chemicals Weapon Convention)	Ministry of Foreign Affair Ministry of Industry (MOI)/Department of Industrial Works (DIW – National Coordinating Body)	– Legal Preparation for the Chemicals Weapon Convention.
FAO International Code of Conduct on the Distribution and Use of Pesticides (voluntary procedure)	Ministry of Agriculture and Cooperatives (MOAC)/Department of Agriculture (DNA to PIC for Pesticides)	1. Implementation of national PIC procedure 2. Implementation of International Code of Conduct in cooperation with FAO since 1985.
GATT/WTO agreements (related to Chemicals trade)	Ministry of Commerce (MOC)/Department of Trade Negotiations (DTN)	
ILO Convention 170 (Safety in the Use of Chemicals at Works)	Ministry of Labour (MOL)/National Institute for the Improvement of Working Conditions and Environment (NICE)	– Considering the ratification of ILO 170 – Analysing the impact of implementing ILO 170 and preparation/needs.
ILO Convention 174 (Prevention of Major Industrial Accidents)	Ministry of Labour (MOL)/National Institute for the Improvement of Working Conditions and Environment (NICE)	– Considering the ratification of ILO 174 – Analysing the impact of implementing ILO 174 and preparation/needs.
Rotterdam Convention on the Prior Informed Consent Procedure for Certain Hazardous Chemicals and Pesticides in International Trade (PIC)	Ministry of Natural Resources and Environment (MONRE)/ (PCD – DNA to PIC for Chemicals other than Pesticides) Ministry of Agriculture and Cooperatives (MOAC)/ (DOA – DNA to PIC for Pesticides) Ministry of Industry (MOI)/ (DIW – DNA to PIC for Industrial chemicals)	– Endorsing the Ministerial Notification on the Listing of the Chemicals governed by the Rotterdam Convention.

Table 10.B : Participation in International Agreements/Procedures Related to Chemical Management (continued)

International Agreement	Primary Responsible Agency	Relevant National Implementation Activities
Stockholm Convention on Persistent Organic Pollutants(POPs)	Ministry of Natural Resources and Environment (MONRE)/ Pollution Control Department (PCD – DNA)	<ul style="list-style-type: none"> – Establishing the Subcommittee for Stockholm Convention – Drafting the National Implementation Pan : NIP.
UN Convention against Illicit Traffic in Narcotic Drugs and Psychotropic Substances	Ministry of Justice (MOJ)/Office of the Narcotics Control Board (ONCB)	- Same as the activities listed under UN INCB in Table 10.A (page 10/3).
UN Globally Harmonized System of Classification and Labelling of Chemicals (GHS)	Ministry of Industry (MOI)/Department of Industrial Works (DIW) Ministry of Agriculture and Cooperatives (MOAC) Ministry of Public Health (MOPH)/Food and Drug Administration (FDA) Ministry of Transport (MOT)	<ul style="list-style-type: none"> – Convening GHS awareness raising public forum – Establishing the Ad hoc Subcommittee for GHS under the Hazardous Substance Committee – Purple Book Translation – Convening GHS introduction course – Conducting Situation Analysis.
UN Recommendation for the Transport of Dangerous Goods	Ministry of Transport (MOT)	
UNEP London Guidelines for the Exchange of Information on Chemicals in International Trade (voluntary procedure)	Ministry of Natural Resources and Environment (MONRE)/ Pollution Control Department (PCD) (DNA to PIC for Chemicals other than Pesticides)	<ol style="list-style-type: none"> 1. Implementation of national PIC procedure 2. Implementation of London Guidelines for the Exchange of Information on Chemicals in International Trade in cooperation with UNEP since 1989.
Vienna Convention for the Protection of the Ozone Layer (1985) and Montreal Protocol on Substances that Deplete the Ozone Layer (1987) and Its Amendment	Ministry of Industry (MOI)/Department of Industrial Works (DIW – Competent Authority)	– Defining legal measure for the restricted monitoring of the Chemicals governed by the Convention.

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
ACIAR – Development and Delivery of Practical Disease Control Programs for Small Scale Shrimp Farmers (2001 – 2005)	Australia	Ministry of Agriculture and Cooperatives (MOAC)/Department of Fisheries (DOF)	<ol style="list-style-type: none"> 1. Identifying extension strategies <ul style="list-style-type: none"> - Analyze extension environment - Develop Project extension strategies - Conduct extension strategy stakeholder workshops 2. Validating control programs <ul style="list-style-type: none"> - Validate control programs on key farms 3. Demonstrating control programs 4. Extending control programs.
ACIAR – Development of Technologies to Alleviate Soil Acidification in Legume-Based Production System in the Tropics of Asia and Australia (2000 – 2004)	Australia	Khon Kaen University	
ACIAR – Impact of Heavy Metals on Sustainability of Fertilization and Waste Recycling in Peri-Urban and Intensive Agriculture in South-East Asia (2001 – 2005)	Australia	Ministry of Agriculture and Cooperatives (MOAC)/Department of Agriculture (DOA)	<ol style="list-style-type: none"> 1. Training and Infrastructure Improvements 2. Development of baseline contaminant levels for soils and threshold contaminant levels for soils 3. Sustainability of use waste materials in intensive periurban agricultural systems 4. Adoption of outcomes.

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
ACIAR – Integrated Control of Mango Insect Pests Using Green Ants as a Key Element in the Kingdom of Thailand (2001 – 2004)	Australia	Prince of Songkhla University	<ol style="list-style-type: none"> 1. Effects of green ants on the main mango insect pests 2. Effects of green ants on the natural enemies of homopteran pests 3. Effects of mix-cropping on mango insect pests and natural enemies 4. Reduce of green ant activity and aggressiveness 5. Stabilize green ant population 6. Selection of insecticides 7. Integrated pest management (IPM) model constructional materials 8. Test the model and the model modification/Make educational materials 9. Implementation of the IPM model by a Trainer-fanner-researcher system.
Agrochemical Pollution of Water Resource under Tropical Intensive Agriculture Systems (1996 – 1999)	Australia	Prince of Songkhla University	<ol style="list-style-type: none"> 1. Training and Conduct Regional Pollution Assessment <ul style="list-style-type: none"> - Planning/selection of sampling site - Conduct site assessment/characteristic analysis 2. Adoption/Evaluation Model for Risk assessment <ul style="list-style-type: none"> - Result interpretation asaption/evaluation models for risk assessment - Modify models to suit local condition - Models made user-friendly - Train staff in modal use - Evaluate application with field data 3. Quantify Pollutant Transport and System Parameters <ul style="list-style-type: none"> - Instrument field site for pollution fluxes - Sampling/analysis of samples - Quantifying system parameters

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Agrochemical Pollution of Water Resource under Tropical Intensive Agriculture Systems (1996 – 1999) (continued)			<ul style="list-style-type: none"> - Establishing relationships between pollutants and parameters - Field Trials for risk assessment.
Insect Resistance and Silvicultural Control of the Shoot Borer, <i>Hypsipyla robusta</i> Feeding on Species of Meliaceae in the Asia-Pacific Region (1999 – 2002)	Australia	Ministry of Agriculture and Cooperatives (MOAC)/The Royal Forest Department (RFD)	<ol style="list-style-type: none"> 1. Preparation for field trials 2. Identify resistant genotypes of swieleninideae 3. Determine mechanisms of resistance 4. Assessment of companion planting 5. Assessment of under-planing 6. Assessment of insecticide and fertilizer 7. Ecogeographic survey of <i>H.robusta</i> on chukrasia 8. Provide training in forest entomology.
Biodiversity Monitoring and Management Project (BIOMOMA) (2000 – 2002)	DANCED	Ministry of Natural Resources and Environment (MONRE)/ Office of Environmental Policy and Planning (OEPP)	<ol style="list-style-type: none"> 1. A refined methodology and approach to national Red Data documentation has been developed that meets national requirements and is compatible with agreed international standards (IUCN calories), and a guideline produced accordingly 2. A set of Red Data documents produced based on existing knowledge to pilot-test the guideline including recommendations for next steps. The Red Data will describe the conservation status of groups of species adjusted to Thailand's requirements in a format compatible to the basis of IUCH's criteria 3. To make staff of OEPP enable to coordinate and manage a national System for compilation and revision of Red Data in Thailand, and relevant staff of research institutions enable to prepare Red Data Documentation according to the guidelines 4. A set of recommendations on action needed of enhance draft national guidelines on Biodiversity impact Assessment has been produced and discussed at a national and a regional workshop.

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Cleaner Technology (CT) Capacity Building in DIW (1998 – 2003)	DANCED	Ministry of Industry (MOI)/Department of Industrial Works(DIW)	<ol style="list-style-type: none"> 1. Increasing DIW's Capacity on promotion and Implementing Cleaner Technology 2. Drafting CT implementation plan and CT action plan 3. Starting implementation of CT action plan in target industries.
Samut Prakarn Wastewater Management Project Phase II (2000 – 2003)	DANCED	Ministry of Natural Resources and Environment (MONRE)/Pollution Control Department (PCD)	<ol style="list-style-type: none"> 1. Wastewater Monitoring and Testing Quality control 2. Tariffs and Collection of Wastewater Charges 3. Future Management Contract for Operating Authority 4. Legislative issues.
Strengthening Farmers' IPM in Pesticide-Intensive Areas (2001 – 2004)	DANCED	Ministry of Agriculture and Cooperatives (MOAC)/Department of Agriculture (DOA)	<ol style="list-style-type: none"> 1. A definition of the IPM concept defined by the stakeholders involved in the project 2. Training in IPM and in participatory approach and techniques conducted for extension officials, officers of Agricultural Research and Development (OARDs) and farmers 3. Reduced use of synthetic pesticides in pest control 4. Increased use and production of organic pesticide methods in pest control 5. Adapted IPM package developed for 12 kinds of fruit and vegetable crops within the project area and introduced to the farmers 6. Increased adoption by farmers of safe pesticide handling storage and application methods.
Ministry of Industry (MOI)/Department of Industrial Works (DIW – National Coordinating Body)	Ministry of Industry (MOI)/Department of Industrial Works (DIW – National Coordinating Body)	Ministry of Industry (MOI)/Department of Industrial Works (DIW – National Coordinating Body)	Ministry of Industry (MOI)/Department of Industrial Works (DIW – National Coordinating Body)

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Improving the Management of Salt-Affected Soils: Case of Saline Patches in Rainfed Paddy Fields in North East of Thailand (2001 – 2004)	France	Ministry of Natural Resources and Environment (MONRE)/Land Development Department (LDD)	<ol style="list-style-type: none"> 1. To evaluate the factors, the risks and the speed of Salinity extension, at field scale 2. To determine the seasonal dynamics of chemical and physical properties in salt affected soils 3. To identify the reversible and irreversible processes involved in soil salinity development 4. To evaluate the consequences of farmers practices on soil salinity 5. To evaluate the processes of soil evolution resulting from Traditional farmers' practices to combat salinity 6. To contribute to the development of Thai expertise on Saline soils 7. To train young scientists in the field of soil salinity both in Thailand and overseas 8. To organize a workshop on the dynamics of water, salt and nutrients in saline rice fields 9. To publish the results of the project in reports and scientific journal.
Towards the Improvement of Rubber Productivity (1998 - 2004)	France	Kasetsart University	<ol style="list-style-type: none"> 1. Gaining the first understanding of the ecophysiological status of the rubber tree 2. An improved procedure for early assessment of new clones for their production potential and adaptability to various environment and to new objectives 3. The assessment of biochemical tools for the improvement of natural rubber quality, consistency and tractability.
Appropriate Regulatory Measures and Policy Reform for Pesticide Risk Reduction (2000 - 2003)	Germany	Ministry of Agriculture and Cooperatives (MOAC)/Department of	<ol style="list-style-type: none"> 1. Proposals for the improvement for pesticide policy and its implementation prepared and followed-up 2. Registration process and implementing structure improved

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Appropriate Regulatory Measures and Policy Reform for Pesticide Risk Reduction (2000 - 2003) (continued)		Agriculture (DOA)	according to international standards 3. Enforcement system and procedures improved in cooperation with private sector and NGOs 4. Farmers access to Integrated Pest Management (IPM) information and skills increased 5. Strengthening consumer awareness of and participation in pesticide-related issues.
Biological Control of Rodents Phase III (1998 – 2001)	Germany	Ministry of Agriculture and Cooperatives (MOAC)/Department of Agriculture (DOA)	1. A suitable bait formulation development and tested in at least two countries 2. Methods for production of sporocysts of <i>singaporensis</i> established 3. Application of control method tested in pilot areas 4. Private sector involved in production and marketing of parasite-bait.
Environmental Advisory Assistance for Industry Phase IV (1997 – 2001)	Germany	Ministry of Industry (MOI)/Department of Industrial Works (DIW)	1. Sector specific environmental management guidelines and standards are elaborated, agreed and endorsed by the responsible committee. 2. Economic instruments for the generation of incentives for waste avoidance and emission reduction in relevant industrial sectors have been introduced and are at the beginning of being implemented 3. Instruments of industrial environmental management are known in the project branches and have been implemented by some of the companies 4. Decision makers & professionals from industries, governmental and non-government organizations are

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Environmental Advisory Assistance for Industry Phase IV (1997 – 2001) (continued)			sensitized and operated in order to implement industrial environmental management 5. Hazardous waste register (database) for the logistic planning in hazardous waste management established as model.
Improvement of the Municipal Waste Management in Phitsanulok Project (1998 – 2002)	Germany	Municipality of Phitsanulok	<ol style="list-style-type: none"> 1. The waste management system for Phitsanulok is strengthened improving collection, transport, recycling and disposal 2. The population is actively involved in measures to avoid recycle and collect solid waste 3. Phitsanulok Municipality will be a model case in Thailand on improved services delivery on local level 4. Collaboration with surrounding administrative organizations is conducted to solve jointly the problems waste management.
Preparation of “A Policy and Master Plan of Agriculture pesticides 2002 – 2006”	GTZ (Government of Germany, Plant Protection Programme)	Ministry of Agriculture and Cooperatives (MOAC)/Department of Agriculture (DOA)	
Disaster Management for the Transport of Hazardous Substances	GTZ (Government of Germany, Plant Protection Programme)	Economic Preparing Division, National Economic and Social Development (NESDB)	<ol style="list-style-type: none"> 1. Rule criteria and standard setting of safety on chemical and hazardous substance transportation 2. Information system development 3. Emergency.
National Inventor of Sources and Releases of Polychlorinated Dibenzodioxins and Polychlorinated Dibenzofurans (PCDDs/PCDFs) 1999	GTZ (Government of Germany, Plant Protection Programme) / UNEP / Euro Chlor	Ministry of Natural Resources and Environment (MONRE)/Pollution Control Department (PCD)	<ol style="list-style-type: none"> 1. Establishing the Inventory.
Options for Upgrading the Phuket Solid Waste Incineration Plant, 2001	GTZ (Government of Germany, Plant Protection Programme)	MONRE /Pollution Control Department (PCD)	<ol style="list-style-type: none"> 1. Plant upgrading.

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Management of Hazardous Waste from Households and Small-scale Industry in Phitsanulok/Thailand 2000	GTZ (Government of Germany, Plant Protection Programme)	Phitsanulok Municipality	<ol style="list-style-type: none"> 1. Revise, verify and collate existing data 2. Develop a technical concept for hazardous waste separation 3. Determination of capacity and capacities of private sector.
National Inventory of Transformers and Capacitor Containing PCBs in Thailand (2000 – 2004)	GTZ (Government of Germany, Plant Protection Programme)	Ministry of Natural Resources and Environment (MONRE)/Pollution Control Department (PCD)	Evaluating and monitoring.
Appropriate Technology for Reduction Agrochemical in Northern Thailand (2003 – 2006)	Japan	Chiang Mai University	<ol style="list-style-type: none"> 1. The number of analyzed production 2. The accuracy of analysis 3. X kinds of disease and insect damage that staff of the Center diagnose 4. The number of revision of web-site 5. The number of access to the reports utilizing the result analysis.
The Acid Deposition Control Strategy (2001 – 2006)	Japan	Ministry of Natural Resources and Environment (MONRE)/Pollution Control Department (PCD)	<ol style="list-style-type: none"> 1. The emission inventories of substances that cause acid deposition in the whole country are developed 2. A long-range Transport model is applied 3. Possible technical options to mitigate substances that cause acid deposition is substances that reviewed 4. Technical staff of relevant government agencies/institution on the above subjects are trained 5. The acid deposition-monitoring network in the country is reviewed.
The Project on the Industrial Water Technology Institute (IWTI), Phase II (1998 – 2000)	Japan	Ministry of Industry (MOI)/Department Industrial Works (DIW)	<p>The organization of the project will be institutionalized be operated efficiently</p> <ol style="list-style-type: none"> 1. Equipment for basic measurement and analysis in the factory

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
The Project on the Industrial Water Technology Institute (IWTI), Phase II (1998 – 2000) (continued)			<p>practice will be installed and maintained properly</p> <ol style="list-style-type: none"> 2. The basic technology relating to industrial water will be acquired by IWTI counterparts 3. The present situation on industrial water use in the factories will be understood by IWTI Counterparts 4. A middle and long-term operation plan of IWTI will be formulated.
Study of Acidification in Thailand (2001 – 2003)	Sweden	Ministry of Natural Resources and Environment (MONRE)/Department of Environmental Quality Promotion (DEQP)	<p>– The monitoring program will include monthly measurements of acid deposition and air quality at seventies in Thailand during one year. In addition, soil water and surface water will be sampled and analyzed at some occasions. On the basis of monitoring results, emissions, atmospheric transport and deposition modeling an assessment will be made of the acidification situation in Thailand and the risk for damages to vegetation, soils and the risk for damages to vegetation, soils and surface water.</p>
Capacity Building in Environmental Toxicology, Technology and management to Promote Sustainable Development, in Southeast Asia and Some Other Developing Countries in Asia and Pacific (1997 – 2002)	UNDP	Chulabhorn Research Institute (CRI)	<ol style="list-style-type: none"> 1. Provision of training in environmental and industrial toxicology, environmental monitoring for toxic chemicals and pollutants, environmental technology and biotechnology, and health and environmental risk assessment and risk management 2. Development of national enabling environment and capacity (policy instrument, institutions as well as human resources) to ensure safe use of chemicals for sustainable development 3. Establishment of a network of scientific and technical cooperation among participating countries in the subject areas to provide technical assistance, exchange of personnel and information on among the countries within and outside the region.
Projection on National Chemicals Management Profile Preparation, Priority Setting and Information Exchange for	UNITAR	Ministry of Public Health (MOPH)/Food and Drug Administration (FDA)	<ol style="list-style-type: none"> 1. Developing Thailand National Chemicals Management Profile by participating approach 2. Convening Workshop on National Priority Setting for Sound

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Sound Chemicals Management Projection on National Chemicals Management Profile Preparation, Priority Setting and Information Exchange for Sound Chemicals Management (continued)			Chemical Management 3. Establishing National Chemical Safety Website.
Project on Environment and Health Impact Assessment of Agricultural Chemicals	WHO-UNEP Health and Environment Linkages Initiative (HELI)	Ministry of Public Health (MOPH) / Department of Health (DoH)	1. Analysis of needed tools for effective decision making, policy development and implementation process of risk management of agrochemical utilization in Thailand.
ASEAN Cosmetic Good Manufacturing Practice (GMP)	The EC-ASEAN Regional Economic Cooperation Program on Cosmetics - ASEAN Consultative Committee for Standards and Quality (ACCSQ) - European Committee for Standardisation (Comité Européen de Normalisation: CEN)	Ministry of Public Health (MOPH)/Food and Drug Administration (FDA) Cosmetic Control Group Bureau of Cosmetic and Hazardous Substances Control	1. Training programme in EU 2. Review and finalization of 14 modules 3. On the job-training 4. Audit for GMP certification.
ASEAN Cosmetic Post Marketing Surveillance (PMS) and Product Safety Evaluation (PSE) on Cosmetics	Same as for ASEAN Cosmetic Good Manufacturing Practice (GMP)	MOPH /Food and Drug Administration (FDA) Cosmetic Control Group Bureau of Cosmetic and Hazardous Substances Control	1. Regional Training for finalizing testing methods for laboratory expertise 2. Training programme in EU for laboratory expertise 3. Proficiency testing programme for laboratory expertise 4. Final workshop on harmonized testing methods for laboratory expertise 5. Regional basic and indepth training for country regulatory bodies 6. On the job-training in EU for country regulatory bodies

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
ASEAN Cosmetic Post Marketing Surveillance (PMS) and Product Safety Evaluation (PSE) on Cosmetics (continued)			<ol style="list-style-type: none"> 7. Regional Training on post-marketing surveillance 8. On the job-training on post-marketing surveillance in ASEAN countries 9. Training for testing laboratory on indigenous materials 10. Technical Information Access 11. Regional workshop on Metrology and Services.
Institutionalising ASEAN Cosmetic Scientific Body (ACSB)	Same as for ASEAN Cosmetic Good Manufacturing Practice (GMP)	Ministry of Public Health (MOPH)/Food and Drug Administration (FDA) Cosmetic Control Group Bureau of Cosmetic and Hazardous Substances Control	<ol style="list-style-type: none"> 1. Meeting of the ACSB committee 2. Preparation and collation of all EU safety documents 3. Establishing procedures and guidelines 4. On the job training in EU 5. Management of the Cosmetic Sub-programme.
Intra ASEAN Pharmaceutical MRA	EC-ASEAN Economic Cooperation Programme on Standards, Quality and Conformity Assessment (The EC-ASEAN Regional Economic Cooperation Program on Pharmaceuticals) -ASEAN Consultative Committee for Standards and Quality (ACCSQ) -European Committee for Standardisation (Comité Européen de Normalisation:CEN)	Ministry of Public Health (MOPH)/Food and Drug Administration (FDA) Drug Control Division	<ol style="list-style-type: none"> 1. EC-ASEAN Conference on EU system for centralized marketing authorizations, mutual recognition and circulation of pharmaceuticals.

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Strengthening Pharmaceutical GMP implementation and enforcement Strengthening Pharmaceutical GMP implementation and enforcement (continued)	Same as for Intra ASEAN Pharmaceutical MRA	Ministry of Public Health (MOPH)/Food and Drug Administration (FDA) Drug Control Division	<ol style="list-style-type: none"> 1. Regional meeting of experts on GMP in the pharmaceutical sector 2. Hands-on training of GMP Inspectors and local industry experts 3. Hands-on training in EU for GMP Inspectors and local industry experts 4. Expert Advice and Support for the establishment of the quality system for national GMP.
Strengthening Technical Capacity in the Evaluation of Documentation required by ASEAN Common Technical Dossiers (ACTD)/ ASEAN Common Technical Requirements (ACTR) for Pharmaceuticals	Same as for Intra ASEAN Pharmaceutical MRA	Ministry of Public Health (MOPH)/Food and Drug Administration (FDA) Drug Control Division	<ol style="list-style-type: none"> 1. Expert consultation on ACTD/ACTR 2. Regional training workshop on ACTD/ACTR 3. Training in the assessment of data submitted for marketing authorization 4. Development of a regional reference operational guide for Standard of Practics (SOPs) in the implementation of ACTD/ACTR 5. Technical assistance and training for DRA Evaluation Unit in Thai FDA 6. Technical Advice and training for Drug evaluation staff in BADAN PENGAWAS OBAT DAN MAKANAN (Badan POM – the National Agency of Drug and Food Control), Indonesia 7. Technical advice and training for drug evaluation staff of product services division in Bureau of Food and Drug (BFAD), The Philippines.
Development of harmonised template for approved pharmaceutical product information	Same as for Intra ASEAN Pharmaceutical MRA	MOPH /Food and Drug Administration (FDA) Drug Control Division	<ol style="list-style-type: none"> 1. Regional Expert Consultation on the establishment of an ASEAN Summary of Product.
Strengthening Post-Marketing Quality Monitoring of Pharmaceutical Sector	Same as for Intra ASEAN Pharmaceutical MRA	MOPH /Food and Drug Administration (FDA) Drug Control Division	<ol style="list-style-type: none"> 1. Regional workshop on sampling strategies and procedures.

Table 10.C: Participation as Recipient in Relevant Technical Assistance Project (continued)

Name of Project	International/Bilateral Donor Agency Involved	National Contact Point	Relevant Activities
Strengthening Quality Control Laboratories for Pharmaceutical Sector	Same as for Intra ASEAN Pharmaceutical MRA	Ministry of Public Health (MOPH)/Food and Drug Administration (FDA) Drug Control Division	<ol style="list-style-type: none"> 1. Regional Workshop on access to reference substances 2. Training in the production and maintenance of reference substances 3. Training in the conduct of proficiency test 4. Organisation of ASEAN proficiency tests.

CHAPTER XI

Awareness / Understanding of Workers and Public

For the long-term commitments in protecting public health and the environment from chemical hazards, the Government of Thailand has exercised several national socio-economic development plans (NSEDP). Since the 8th NSEDP (1997-2001), human resource has been emphasized as the focus of development. Subsequently, the 9th NSEDP (2002-2006) has concentrated on the national sustainable development under His Majesty the King's philosophy of "Sufficiency Economy". In its implementation phase, effort has given to balance the development of human, social, economic and environmental resources. This calls for attentions of all concerned governmental agencies to make their concerted efforts to prevent and solve public health and environmental problems, which includes public education and awareness building. Moreover, the new Constitution of Kingdom of Thailand (1997) has steadily increased the freedom and enhanced the role of labour / civil society organizations, non-governmental organizations and mass media, in lifting public awareness and consolidating social movement in addressing chemical-related problems.

Nevertheless, the negative and threatening effects of chemicals on public health and the environment are still growing, getting more complex and cross-related. In occupational setting, major accidents and illness of workers are often associated with the exposure to chemicals. The problems mainly resulted from the lack of knowledge and understandings among workers and the public.

In preventing workmen and the public from chemical hazards, the most efficient measure remains to be the provision of relevant and comprehensible information so as to instil the awareness and incorporate knowledge of chemical dangers, and the proper and safe use of the chemicals. The measure has been taken by concerned government agencies, non-governmental organizations, academia, business, and civil society, at various degrees. The followings provide details of the ongoing activities that strengthen public awareness and understanding, aiming to promote the sound management of chemicals.

11.1 Policy and the National Master Plan on Chemical Management

As a part of the national sustainable development strategy and the follow up of the Rio Conference on Environment and Development – Agenda 21, Thailand has developed a National Master Plan on Chemical Management (NMPCM). The master plan constitutes strategies and action plans drafted according to the priority of concerns with input and consent from stakeholders of all sectors. It provides the scope of work, responsibility, and

authority, followed by budgetary support for the responsible government agencies. The plan also suggests directions and cooperative schemes for the other sectors – private and NGOs, to consider for their function and implementation. The issue of public awareness and education has received high priority.

To date, Thailand is implementing the second NMPCM (2002 - 2006), which consists of five essential strategies as followed:

1. *Development of the national chemical information network*, with the Department of Industrial Works being the main agency to coordinate with the other related agencies and organizations. This network is aimed to develop a database of the chemical control, covering information on chemical properties, safe handling and proper management for all types of chemicals. The information about the responsible agencies at each step of the life cycle is to be included. The system is supposed to be linked nationwide.
2. *Development of the emergency response and preparedness to prevent and handle chemical accidents*. The crux of this strategy is to develop a emergency response database and to call for participation in the prevention of the chemical accidents and mishaps. A clear policy, workable action plan and measure in preventing and dealing with the chemical accident and spillage/leakage have to be developed through the cooperation of at all levels - the policy makers, the responders, and the provincial and local authorities. Role and responsibility of each ministry, department and section should be clearly and correctly specified. These government entities spans across from the Ministry of Industry (Department of Industrial Works) to the Ministries of Defence, Agricultural and Cooperatives, Energy, Public Health, Science and Technology, and Natural Resources and Environment.
3. *Promoting and strengthening national capacities and capabilities in chemical waste management*, through the cooperation between the Department of Industrial Works and Pollution Control Department.
4. *Development of the national poison centres network*. The Ministry of Public Health is the main agency in charge of developing a medical treatment and recuperation system for the patients suffering from chemical poisoning and accidents.
5. *Encouragement of the research and development regarding chemical and chemical safety*. The Thailand Research Fund (TRF) was given the responsibility in coordinating with other agencies and organizations from public and private sectors.

11.2 Regulations and Standards

The Hazardous Substance Act 1992 (HSA, B.E.2535) is the main legal instrument for regulating and controlling the activities related to use of chemical substances in all sectors (agriculture, industries and others).

According to the National Institute of the Improvement of Working Conditions and Environment (NICE), the Labour Protection Act 1998 (LPA; B.E.2541) is the main legislation to regulate and control the occupational health and safety at workplace as well as chemical safety for workers. There are also several related regulations, as specified in Chapter IV of the Thailand National Profile. In addition, there are two management standards related to occupational health and safety: TIS 18001 of the Thai Industrial Standards Institute; and the Sustainable Occupational Health and Safety Management System of the Department of Labour Protection and Welfare.

Specific regulations pertaining to prevention of workmen and the public from chemical hazards are described in more details as follows:

1. *Notification of Ministry of Interior* - Re: Occupational Safety with respect to Working Environment (Chemicals). The notification has details about chemical threshold limits in the workplace.
2. *Notification of Ministry of Interior* - Re: Occupational Safety related to Dangerous Substances. The notification requests the owner/operator of every establishment dealing with chemical(s) in the amount listed, to submit the Material Safety Data Sheet (MSDS) to the Occupational Safety Inspectorate Division, Department of Labour Protection and Welfare. Furthermore, the owner/operator has an obligation to inform workers about hazards of chemicals present in the workplace, as well as to provide appropriate personal protective equipments
3. *Notification of Ministry of Labour* - Re: The Occupational Health & Safety and Working Environment Committee. The prime objective of the notification is to encourage labour organizations' participation in promoting safety management for occupational settings. To facilitate their participation, the Occupational Health & Safety and Working Environment Committee are required to include representatives of employers and employees. The committee has supported the provision of information and proper training courses for workers.
4. *Notification of Ministry of Labour* - Re: The Safety of Employee. The notification requires that every establishment has at least one safety officer who must convey specific training course organized by a certified institution, for workers. The training course must include education on the safe use of chemicals in occupational setting. When any establishment violates or does not abide by all the above-mentioned notifications, the authority particularly the Occupational

Safety Inspectorate Division can send notice to the owner of that establishment and pass the case to the Labour Court to make consideration for penalty.

5. *Related legislations related with Consumer Products Safety under the execution of Food and Drug Administration (FDA).* The FDA is the responsible agency for enforcement of 6 Acts and 1 emergency decree dealing with public safety over a wide range of consumer products, including household pesticides, cleansing products, disinfectants, cosmetics, foods and other medical and personal care products.

11.3 The Accomplishment and Ongoing Activities of Public Awareness Enhancement

Giving knowledge and making concern of chemical hazards to workers and publics is one of the main duties of several ministries, namely, Ministry of Public Health, Ministry of Labour, the Ministry of Industry, Ministry of Agricultural and Cooperatives, Ministry of Interior, and Ministry of Natural Resources and Environment. In fulfilling this duty, each government agency has performed various types of activities using numerous means and methods. A few elaborated examples are described.

The Food and Drug Administration (FDA), being the major agency responsible of disseminating information and news of chemical hazard and safety in public health products and consumer goods, communicates with public through the following programs/activities:

- Newsletter on Chemical Safety, published every four months, giving information about chemical impact on health and environment as well as related chemical management issues, to all stakeholders and general public.
- Programs to urge the business to demonstrate proper information on the labels of consumer products, and the public to read the product's label before purchasing.
- "Public Education and Consumer Behaviour Development Activities" Project, to raise awareness of consumers' rights protection and to build their capabilities of being smart consumers - educational programs and campaigns conducted through mass media, nation-wide provincial health offices and schools.
- Food Safety Program, to raise public awareness about pesticide and chemical residues or contaminants in food stuff.
- "FDA Hotline 1556" Program, providing a phone-in service consultation to general public.
- "Little FDA" Program, to provide education to more than 300,000 students in 10,256 secondary schools across the nation.
- Dissemination of chemical safety management information via a website - www.fda.go.th.

The Office of Agricultural Regulation, Department of Agriculture, Ministry of Agriculture and Cooperatives, directly educates the farmers and public about the harmful agricultural chemicals through many activities, such as:

- Standard setting for organic farming, and monitoring of chemical uses for group 1a and 1b chemicals, which include endosulfan.
- Implementation of several measures following the Pesticide Control Master Plan (2002 – 2006), and Food Safety Policy of the Department of Agriculture.
- Research projects on chemical residues in the environment especially in the inland water and soil, and the effect of these chemical residues on animals.

Recently, the Thai Health Promotion Foundation which is a public enterprise has provided support to the Federation of Thai Industries to conduct a project to develop a better quality of life in the workplace for three years from September 2003. The objective of the project is to solve the health problem of workers, improve the working conditions and quality of life in the workplace including the enhancement of competitiveness through the management system of quality of work life: MS-QWL or ISO-Health in brief comparative description. The crux of the project is to transform the concept and principle of integrative healthcare program into a standard procedure that can be practiced in the actual workplace. At present, 20 companies have joined the pilot program which is anticipated to expand to cover 100 workplaces at the end of the project.

In concerted with the tasks of the government agencies, other organizations – academic, civil society, NGO, and private sectors, have shown their concerns of chemical safety and management through various programs and assignments, on their own initiatives and/or joint efforts with the government sector. These activities are demonstrated in the following sections.

1) Publications

A large number of publications concerning chemical safety have been produced by various government agencies, NGOs, research institutions and business associations. Most of them are available free of charge. The followings are examples of related publications:

1. Chulabhorn Research Institute (CRI) / ICEIT Newsletter, quarterly published, with an aim to disseminate recent information on environmental and industrial toxicology.
2. Newsletter on Chemical Safety, issued every four months by the FDA. The newsletter contains articles related to health and environmental risk assessment, chemical-related topics of concern, and other news. The prime objective of the newsletter is to raise awareness and understanding of all stakeholders, as well as the public about current situations and trends of national and international chemical management.

3. Weekly Epidemiological Surveillance Report, delivered by Bureau of Epidemiology, Department of Disease Control, constantly informs all concerned and the public about update epidemiological statistics of morbidity and mortality caused by chemicals and interesting health issues.
4. Toxic Substance News and Report, issued every four months, by Department of Agriculture (DOA), in order to distribute updated news and research findings about agricultural chemicals. Besides, DOA distributes a technical newsletter every two months as a communication tool towards importers, exporters, manufacturers and distributors of agricultural chemicals as well as the public.
5. Thailand Journal of Health Promotion and Environmental Health (by Department of Health) and Occupational Safety and Health Newsletter (by Department of Labour Protection and Welfare). These newsletters inform the public about occupational diseases induced by chemicals and appropriate management of chemicals in the workplace.
6. Publications by NGOs, including Occupational Health and Safety at Work Association, Campaign for Alternative Industry Network (CAIN), and Greenpeace. Several NGOs conduct analysis on chemical problems of specific concern, and then bring up the findings and lessons learned to the public attention. For example, CAIN produced publications to inform the public about threatening impact of the chemical accident in Klong-Toey over the local residents.
7. Publications by chemical business associations. For instance, the Thai Crop Protection Association educates the public and agricultural workmen about MSDS, safe use of pesticides, appropriate protection/handling, and proper waste management.
8. Other printed materials, such as posters, pamphlets, and fact sheets have been distributed by all concerned governmental bodies, private sector, and civil society organizations. The publications are to improve the public understanding about the pros and cons of chemicals, rational chemical management, and biological alternatives to agricultural chemicals.

2) Television Programs

Television has been proved to be one of the most efficient means to disseminate information to the public. Several attractive television programs/spots relating to chemical safety are regularly broadcast in order to raise the public awareness, as follows:

- Food Safety series by Ministry of Public Health, in order to safeguard public health from avoidable risk of chemical residues and contaminants in food stuffs.
- Advanced Agriculture and Quality Product series, by Department of Agriculture.
- Smart Consumer series by FDA.
- “Reading Product’s Label before Purchase” spots campaign by FDA, to raise public concerns regarding consumer product safety.

3) Radio Programs

A number of radio programs disseminate information and updated news to enhance workers' and civil communities' knowledge about chemical hazards. These radio programs are produced by Department of Labour and Welfare, Department of Industrial Works (concerning ozone depleting substances), FDA (regarding consumer protection) and Ministry of Defence (to promote the use of biological alternatives for chemicals in agriculture and water treatment).

4) Educational Programs

The Ministry of Labour has continuously organized training courses for all levels of safety officers, and in collaboration with Ministry of Education, has integrated training courses on chemical management in the workplace, into the education programs offered at vocational colleges and universities.

The Department of Agricultural Extension (DOAE) regularly provides the agricultural workmen, a training series on safe use of pesticides. Recently, DOAE has facilitated Farmer Field Schools (FFSs) across the country, to order to reduce the use of agrochemicals and to support good agricultural practice, by self-learning process of local agricultural communities.

The FDA has developed an educational program for school children called "Little FDA Program". This special program has successfully given knowledge to more than 300,000 students in about 10,200 secondary schools all over the country, and built their capabilities to protect themselves from harmful components in foods and other products used in the households and communities. It is envisaged that these trained teenagers will grow up with good sense and conscience for safety, and will transfer the concept to other members in their families.



In the formal education system, special courses and programs are being offered at different levels. At the university level, chemical hazard and safety measure is becoming a common subject and has been made a requirement for students at the post-graduate levels. Green chemistry and microchemistry are developed for practical classes and teaching purposes. Particularly, two post-graduate programs have been recently established: the Environmental Science, Technology and Management, headed by the Chulabhorn Research Institute; and the Environmental and Hazardous Waste Management, operated by the National Research Center for Environmental and Hazardous Waste Management, a consortium of five universities with Chulalongkorn University being the lead institution. The former program focuses on chemical toxicology and public health while the latter covers treatment technology, remediation of chemical contaminated areas, cleaner production, utilization of chemical and hazardous waste, and chemical information management and policy.

5) Public Forums, Seminars and Exhibitions

A number of public forums related with chemical management have been held by academia, research institutions and concerned government agencies. Public forum has been recognized as a means to initiate dialogues among all stakeholders on issues of concern. Examples of such successful events are those organized by the Thailand Research Fund to solicit all stakeholders' comments on the specific topics of chemical safety that were discussed in the Intergovernmental Forum on Chemical Safety—Forum IV in 2003. In addition, the National Health Assembly, annually arranged by the Health System Research Institute (HSRI), has been an active platform where civil society organizations provide their views and call for the government actions to tackle health and environmental problems, particularly those posed by agricultural chemicals.

With regards to occupational safety and health, the “National Safety Week” is a major event of exhibitions and seminars, organized to disseminate information and raise workers' concern and understanding about chemical safety, by the Ministry of Labour. This 5-day national event attracts thousands of employers, employees and general public every year. Moreover, Ministry of Labor organizes this kind of event in 5 provinces each year in order to make workers all over the country have access to occupational and health information.

6) Web-based and Digitized Information

With the rapid expansion of the computer infrastructure and the access to internet connection in Thailand, the web-based information dissemination is another strategy used by most government bodies, business sectors, academic institutions and certain NGOs in order

to communicate with the public at large. Regarding chemical management, a number of well maintained websites have been developed, e.g. Thailand Chemical Safety Website (by FDA in the capacity of the secretariat body of the National Coordinating Committee on Chemical Safety), CHEMTRACK Website (by the National Research Center for Environmental and Hazardous Waste Management), and other specific websites (more details in section 11.4). However, one drawback of web-based approach is that the message cannot reach the large number of populations having no access to the internet, particularly those in the rural areas and the laymen.

The other means of digital information provision is through CD-ROM which are mainly developed for professional use. Examples are the CD-ROM for Medical Personnel of Poison Center (developed by the Medical School of Chiang Mai University, a member of the Poison Center Network in Thailand), and the CD-ROM compilation of International Chemical Safety Cards (ICSCs) in Thai language (developed by FDA).

11.4 Public Roles and Participation

Most of the non-governmental organizations (NGOs) consider the provision of the knowledge and information to build the awareness and the capability to handle chemical substances to workers, farmers and general public, an important task. Some active NGOs are cited with their associated activities as follows:

Arom Pongpangan Foundation - Labour Resource Center, Friends of Women Foundation (FWF), HomeNet Thailand, and the Council of Work and Environment Related Patient Network of Thailand (WEPT) have played important roles in providing the information and advices to people of all classes and professionals about the environment, safety, and precautionary procedures for the hazards of chemical substances. The past records show their long time involvement through organization of workshops and seminars to exchange the experiences and through the continuous effort in producing newsletter for public communication. They previously organized campaign for the promulgation of an act to establish an institution to oversee worker health and safety.

There are a number of NGOs working closely with the farmers and the communities to campaign for the decrease, avoidance and termination of chemical insecticides and fertilizers for the past two decades. One of them is the Alternative Agriculture Network (AAN) whose members include numerous NGOs and civil society organizations from all regions of the country.

The Foundation of Consumers uses the 'Smart Buyer' Magazine and the other mass communication media to inform consumers and general public about the chemical hazard and the subsequent effects to stimulate their conscience in safe-guarding themselves.

The Campaign for Alternative Industry Network (CAIN) and the Southeast Asia Green Peace are the environmental NGOs that aim to educate and stimulate public to be aware of toxic substances, through public campaign and many forms of mass communications.

11.5 Cooperation between the Government and Civil Society

The cooperative effort of the government and the civil society to draft the National Health Act corresponding to the 1997 Constitution of the Kingdom of Thailand has enhanced the cooperation between the governmental agencies and the offices under the jurisdiction of the Ministry of Public Health, namely, the Health System Research Institute (HSRI) and the Health System Reform Office (HSRO), in developing knowledge of and strengthening the civil society on public health policy. This cooperation resulted in formation of active health groups for particular area, and at all levels - provincial, provincial cluster, regional and national. The health group platform has become an important mechanism and a channel for disseminating the knowledge and information about the civil rights and health issue which include the chemical hazard and risk, especially the chemical substances used in agriculture.

In 2004, a national health assembly was organized through the cooperation of HSRI, HSRO, AAN and other civil society organisations from all over the country. The agenda of 'Threatening Hazards of Chemical Substances' was suggested to be the main issue for discussion of the health assembly at all levels held throughout the year. In addition, a policy and strategic draft was proposed to the government under the topic of 'Food and Agriculture for Health' for precautionary measure of chemicals hazard from agricultural use. In concerted with the food safety policy of the Ministry of Public Health, the proposal consisted of 1) The measure for controlling the chemical marketing system with emphasis on the advertisement and the direct sale; 2) The transparency of agricultural chemical control process and the opportunity of public participation; 3) The protection and monitoring of food contamination from toxic substances, through public participation process; and 4) The promotion of sustainable agriculture.

Moreover, the Thailand Research Fund (TRF), the main agency responsible for R&D of chemical safety according to the fifth strategy of the Second National Master Plan on Chemical Management, has promoted and driven the development of many projects in developing knowledge and synthesizing information for public use. The projects resulting

from cooperation of TRF with academic institutions and civil society organizations are exemplified as follows:

- The data coordinating system for the import of chemical substances.
- The coordination concept to develop chemical safety.
- Integration of knowledge from research and development to enhance health and safety of workers in the workplace.
- Reference database of chemicals and hazardous substances.
- Pollution prevention in the food and agricultural products manufacturing plants in the north-eastern region.
- Access to pollution information: a mean to create social safety.

11.6 Problems and Constraints

The Thai society is a democratic one that all citizen has the rights and freedom to receive education, knowledge and all information according to the Constitution while the 1992 National Environmental Quality Enhancement and Conservation Act certifies the human rights in accessing the official information and news about the enhancement and preservation of the environmental quality. There are many more laws to regulate activities related to chemicals and its hazards to people, workers in the factories, environment and natural resources as mentioned above.

Nevertheless, the education and awareness building of chemical hazard in Thailand is still limited in terms of the scope and context as resulted from the level of governmental policy, the existing laws and regulations and their enforcement, the limitations of the relevant entities and civil society organizations, including the influential benefit of the chemical industry over the campaign for chemical education to workers and public.

Policy-wise, the Thai government lacks the political will to seriously give priority to creating chemical safety to the society. The existing policies and measures are therefore not appropriate for solving and preventing the facing problems. With the present government policies in promoting food safety and making Thailand the kitchen of the world so as to increase the competitiveness in the global market, the public health agencies make use of the opportunities to give knowledge about the chemical hazard in agricultural products and food. This quickly and easily stimulates and alerts the society. In fact, the increased public awareness has been the cumulative consequences of the continuous movement and campaign over a long period of time by the civil society organizations and NGOs.

Regarding the laws and the operation of the regulating agencies, there are problems and limitations, such as:

- Rules and regulations are not suitable for the present situation. In addition, there are no supporting legal instruments to set up the penalty. For example, the Labour Act has no specification of provision of chemical knowledge to workers, farmers and public. They need to know the information about the chemicals and raw materials used in the factory, their harmful effect to human and environment and the environmental quality at workplace such as the appropriate lighting, ventilation and safe guarding system. There is no description about worker turnover to avoid the prolong exposure to toxic or harmful chemicals. The laws are not protecting the farmers as the chemical user and producer but as the consumers of fertilizer. In another word, the legal system disregards the chemical end users.
- Some legal instruments have not been used for further planning and policy setting, as illustrated by the notification that requests the operators to inform the officials about the chemical substances they use. However, Thailand currently plans to develop an effective database system to support the enforcement and also for the knowledge dissemination and prevention of problems from occurring to the workers, communities and the entrepreneurs themselves.
- The diversity of government agencies in charge of the matter and their overlapping roles and responsibilities.
- Data and information are not effectively used and analysed. Policy and planning is not usually done cooperatively among related agencies.
- The shortage of workforce and weak regulatory actions, e.g. the lack of stringent control of the store selling agricultural chemicals.

Problems concerning the data and information can be described as follows:

- Most of the chemical information is rather technical and often written in English. This imposes difficulties and limitations to the comprehensibility and learning process of the workers, farmers and general consumers.
- Incomplete information is generally given to workers, farmers and consumers. The information on the chemical properties and the harmful effect is often omitted.
- Problems about the reliability of the chemical information obtained from the producers are constantly encountered by the responsible government agencies. The data verification is also difficult as it can be done only in the laboratory.
- Most of the ongoing public communication (radio, publication, website and others) belongs to the government and the business operators. There is still the need for mass media run by civil society organizations.

11.7 Comment and Analysis

Enhancement of workers' and public awareness and knowledge is an essential element for the success of national chemical safety management since it will enable them to safeguard their health and the environment from avoidable chemical hazards. At present, all stakeholders including government, academic, and business sectors, as well as NGOs, are involved in educating workers and the public about chemical risks and the proper management, through different approaches. This has resulted in a considerable rise of the public concerns and responses to chemical-related problems in the last few years. However, in order to achieve the public capacity building, there is a need for continued commitments of all partners. Besides, more participation of mass media, civil society organizations and local communities is needed for further public mobilization and empowerment.

There are several problems arising from the current awareness raising and education activities on chemical safety. Some approaches of information dissemination are not easily accessible to the public. Most of the chemical information cannot be readily understood due to the appearance of technical terminology. This emphasizes a need to expand the outreach and educational programs to the vulnerable groups of the population. The information transfer should be pursued in a comprehensible language at the laymen level. The self-learning process of civil societies and communities should be encouraged for sustainable capacity building and active public participation in the sound chemical management.

In order to deal with these problems, the following describes the suggested recommendations.

- Some of the existing laws should be reviewed and adjusted to fit the present situations. Particularly, a notification should be included in the Hazardous Substance Act, to protect farmers who produce the agricultural products as the chemical end user.
- The government should set a policy to systematically and continuously monitor and investigate the health impact as well as the accumulation of harmful chemical substances in human body, food chain, environment, and other components in the ecosystem.
- The government agencies and academic / research institutions should cooperate to support and promote dissemination of integrated knowledge related to chemicals to workers, farmers and consumers.
- More research and development activities should be strengthen and expanded in the areas of human health and impact of harmful chemicals covering the worker, farmer and consumer dimensions.

- Labour unions and other civil society organization should be driven to play more roles in providing chemical knowledge and information including the suggestion and advice to the target groups.
- The public accessibility to government and business information and news should be seriously and rapidly facilitated and supported in order to enhance public understanding and awareness for chemical safety.

Chapter XII

Resources Available and Needed for Chemical Management

12.1 Resources Available and Needed in Government Ministries / Institutions

Resources for chemical management in Thailand are distributed to different agencies, mainly in Ministry of Agriculture and Cooperatives, Ministry of Industry, Ministry of Public Health, and Ministry of Natural Resources and Environment, for implementing technical and administrative works. In serving the related issues of import-export control, chemical disaster prevention / mitigation, labor protection, some resources are also available in Ministry of Finance, Ministry of Interior, Ministry of Labor, Ministry of Transport and certain state enterprises. Details of manpower available in each concerned organization for chemical management are depicted in Table 12.A. In addition, there exist a number of chemical-related experts in academic and research institutions. However, there are no statistics on the definite input of financial resource of each agency for chemical management. Table 12.B summarizes professionals and trainings needed in each government agency in order for effective response to current challenges in national chemical management scheme.



Table 12.A: Resources Available in Government Ministries / Institutions

Ministry/Agency Concerned	Number of Professional Staff Involved	Type of Expertise Available	Financial Resource Available (per year)
<p>Agriculture and Cooperatives:</p> <ul style="list-style-type: none"> - Department of Agriculture / Agricultural Production Sciences Research and Development Office Office of Agricultural Regulation, License and Registration Plant Protection Research and Development Office Field Crop Research Institute Horticulture Research Institute - Department of Agricultural Extension / Bureau of Agricultural Product Quality Development, Division of Pest Management 	<p>(total = 156)</p> <p>31</p> <p>7</p> <p>102</p> <p>7</p> <p>9</p> <p>3</p>	<ul style="list-style-type: none"> - Chemistry, Sciences - Agricultural sciences - Entomology, Zoology, Weed sciences, Plant pathology - Plant pathology, Entomology - Plant pathology, Entomology - Agricultural extension in pesticide aspect 	<p>N.A.</p> <p>N.A.</p>
<p>Finance:</p> <ul style="list-style-type: none"> - Customs Department / Laboratory Group 	<p>50</p>	<ul style="list-style-type: none"> - Pharmacy, Industrial chemistry, Technical chemistry, General sciences, Biology, Nutrition 	<p>N.A.</p>

Table 12.A: Resources Available in Government Ministries / Institutions (continued)

Ministry/Agency Concerned	Number of Professional Staff Involved	Type of Expertise Available	Financial Resource Available (per year)
Industry: - Department of Industrial Works - Industrial Estate Authority of Thailand /	298 40	- Chemistry, Toxicology, Environmental engineering, Chemical engineering, Industrial engineering - Environmental engineering, Industrial engineering, Chemical engineering, Sciences (environment, occupational health and safety)	N.A.
Interior: - Department of Disaster Prevention and Mitigation / Disaster Prevention Measures Bureau, Disaster Equipment Sub – Bureau	17	- Sciences in chemical and hazardous substance management aspect	
Labour: - Department of Labour Protection and Welfare / Occupational Safety and Health Inspection Division National Institute for the Improvement of Working Conditions and Environment (NICE)	10 10	- Labour welfare in chemical aspect - Occupational Safety and Health (OSH), Safety sciences, OSH and environment, Industrial hygiene, Chemistry, Engineering, Occupational medicine, Ergonomics	N.A. N.A.

Table 12.A: Resources Available in Government Ministries / Institutions (continued)

Ministry/Agency Concerned	Number of Professional Staff Involved	Type of Expertise Available	Financial Resource Available (per year)
<p>Natural Resources and Environment:</p> <ul style="list-style-type: none"> - Department of Environment Quality Promotion (DEQP) / Environment Research and Training Centre (ERTC) - Pollution Control Department (PCD) / Waste and Hazardous Substance Management Bureau 	<p>62</p> <p>10</p>	<ul style="list-style-type: none"> - Environmental sciences - Chemical emergency response, Hazardous materials emergency response planning (HMER) 	<p>N.A.</p> <p>N.A.</p>
<p>Public Health:</p> <ul style="list-style-type: none"> - Department of Disease Control / Bureau of Occupational and Environmental Disease - Bureau of Epidemiology - Department of Health / Sanitation and Health Impact Assessment Division - Department of Medical Sciences 	<p>43</p> <p>57</p> <p>30</p> <p>709</p>	<ul style="list-style-type: none"> - Toxicology, Biochemistry, Chemistry, Biology, Industrial hygiene, Environmental health, Epidemiology, Occupational health - Medicine, Epidemiology - Environmental health, Sanitation, Health impact assessment, Health promotion - Medical sciences (Chemistry, Microbiology, Pharmacology, Toxicology, Medical Entomology), Pharmacy, Medical technology, Radiophysics, Veterinary, Medicine 	<p>N.A.</p> <p>N.A.</p> <p>N.A.</p> <p>N.A.</p>

Table 12.A: Resources Available in Government Ministries / Institutions (continued)

Ministry/Agency Concerned	Number of Professional Staff Involved	Type of Expertise Available	Financial Resource Available (per year)
Public Health: (continued)			
- Department of Medical Services / Occupational Medicine Center, Nopparatrajathanee Hospital	8	- Occupational Medicine, Nursing	N.A.
- Food and Drug Administration (FDA) / Bureau of Cosmetic and Hazardous Substance Control - Cosmetic Control Group - Hazardous Substances Control Group Chemical Safety Group Drug Control Division Food Control Division Import and Export Inspection Division Medical Device Control Division Narcotics Control Division Public and Consumer Affairs Division Rural and Local Consumer Health Products Promotion Protection Division Technical and Policy Administration Division	(total = 441) 34 24 7 99 68 37 32 49 22 37 32	- Medicine, Pharmacy, Toxicology, Nutrition, Food technology, Inspection, Regulation of consumer products, Policy analysis, Public relations, Law	N.A.

Table 12.A: Resources Available in Government Ministries / Institutions (continued)

Ministry/Agency Concerned	Number of Professional Staff Involved	Type of Expertise Available	Financial Resource Available (per year)
Research Institute: - Chulabhorn Research Institute (CRI)	56	- Toxicology / Environmental toxicology, Biochemistry, Biotechnology, Chemistry, Microbiology, Oncology, Pharmacology	N.A.
Transport: - Land Transport Department - Marine Department - Office of the Permanent Secretary - Port Authority of Thailand	4 24 4 20	- Transport of dangerous goods - Transport of dangerous goods - Chemical database - Transport of dangerous goods and handling	N.A. N.A. N.A. N.A.

12.2 Resources Needed by Government Institutions to Fulfill Responsibilities Related to Chemical Management

Table 12.B: Resources Needed by Government Institutions to Fulfill Responsibilities Related to Chemical Management

Ministry/Agency Concerned	Type of Professional Staff Needed	Training Requirements
<p>Agriculture and Cooperatives:</p> <ul style="list-style-type: none"> - Department of Agriculture Agricultural Production Sciences Research and Development Office Office of Agricultural Regulation, License and Registration Plant Protection Research and Development Office Field Crop Research Institute - Department of Agricultural Extension / Bureau of Agricultural Product Development, Division of Pest Management 		<ul style="list-style-type: none"> - Occupational safety, Pesticide management in laboratories, Pesticide residue analytical technique, Ecological risk assessment of pesticide use - Pesticide toxicity, Risk assessment for pesticide registration - Good agriculture practices, Integrated pest management, Biological control - Organic protection of field crop, Organic farming - Toxicology of pesticides
<p>Finance:</p> <ul style="list-style-type: none"> - Customs / Laboratory Group 	<ul style="list-style-type: none"> - More personnel are needed. 	<ul style="list-style-type: none"> - Analytical methods

Table 12.B: Resources Needed by Government Institutions to Fulfill Responsibilities Related to Chemical Management (continued)

Ministry/Agency Concerned	Number/Type of Professional Staff Needed	Training Requirements
<p>Industry:</p> <ul style="list-style-type: none"> - Department of Industrial Works - Industrial Estate Authority of Thailand 	<ul style="list-style-type: none"> - Chemists, Toxicologists, Information technologists - Safety engineers, Chemical engineers, Environmental engineers, Industrial engineers, Civil engineers, Scientists 	<ul style="list-style-type: none"> - Chemicals hazard and risk assessment, Information system development - Safety audit / verification, Air monitoring for toxic / hazardous chemical release, Information system and communication in emergency situation for hazardous substance
<p>Interior:</p> <ul style="list-style-type: none"> - Department of Disaster Prevention and Mitigation / <ul style="list-style-type: none"> Disaster Prevention Measures Bureau, Disaster Equipment Sub-Bureau 	<ul style="list-style-type: none"> - Professionals in chemical accident management, Inspection and laboratory analysis 	<ul style="list-style-type: none"> - Chemical accident management, Chemical and hazardous waste management, Inspection, Regulation, IT for chemical management, Occupational safety measures, Transport and storage of chemicals, Mitigation of fire and chemical disasters, and utilization of necessary equipment

Table12.B: Resources Needed by Government Institutions to Fulfill Responsibilities Related to Chemical Management (continued)

Ministry/Agency Concerned	Number/Type of Professional Staff Needed	Training Requirements
<p>Labour:</p> <ul style="list-style-type: none"> - Department of Labour Protection and Welfare / Occupational Safety and Health Inspection Division National Institute for the Improvement of Working Conditions and Environment (NICE) 	<ul style="list-style-type: none"> - Chemical professional staffs concerning occupational safety and health - Toxicologists, Information technologists 	<ul style="list-style-type: none"> - GHS, Risk assessment, Hazardous chemical management - GIS and database management system of hazardous chemicals
<p>Natural Resources and Environment:</p> <ul style="list-style-type: none"> - Department of Environmental Quality Promotion (DEQP) / Environmental Research and Training Centre (ERTC) 	<ul style="list-style-type: none"> - Environmental engineers, Chemists, Biologists, Microbiologists, Toxicologists, Programmers, Environmental training staffs, Research assistants 	<ul style="list-style-type: none"> - Risk assessment, Emergency response plan, Method for handling, transport and treatment of hazardous waste and chemicals, Material Safety Data Sheet (MSDS) System, GIS for chemical management and emergency response plan, Heavy metal control (for laboratory), Chemical waste utility, Management of toxic hydrocarbons in petrochemical industry

Table 12.B: Resources Needed by Government Institutions to Fulfill Responsibilities Related to Chemical Management (continued)

Ministry/Agency Concerned	Number/Type of Professional Staff Needed	Training Requirements
<p>Natural Resources and Environment: (continued)</p> <ul style="list-style-type: none"> - Pollution Control Department (PCD) / Waste and Hazardous Substances Management Bureau 	<ul style="list-style-type: none"> - More staffs on chemical emergency response and HMER planning, Environmental Response Team (ERT), Environmental toxicologists, Environmental chemists, Socio-economists 	<ul style="list-style-type: none"> - Clean up – Remediation on contaminated areas, Environmental response technique, Environmental toxicology, Environmental chemistry, IT for environmental management, Risk assessment, Socio-economic analysis
<p>Public Health:</p> <ul style="list-style-type: none"> - Department of Disease Control / Bureau of Occupational and Environmental Disease <li style="padding-left: 40px;">Bureau of Epidemiology - Department of Health 	<ul style="list-style-type: none"> - Toxicologists, Environmentalists, Statisticians, Biologists, Physicists, Biochemists - Environmental toxicologists, Assistant researchers (Environmental health, Occupational health, Toxicology), Programmer - Chemical risk assessors, Epidemiologists, Scientists for chemicals analysis, Statisticians, Public health economists, Policy analysts 	<ul style="list-style-type: none"> - Toxicology, Environmental health, Chemical management, Information technology, Statistics, Chemical surveillance, Chemical monitoring - Risk assessment / management / communication, Investigation / toxicological inspection, Toxicology - Risk management and assessment for chemicals, Epidemiology, Chemicals analysis and management, Toxicology, Environment / Health impact assessment for chemicals application, Policy process, Economic analysis

Table 12.B: Resources Needed by Government Institutions to Fulfill Responsibilities Related to Chemical Management (continued)

Ministry/Agency Concerned	Number/Type of Professional Staff Needed	Training Requirements
<p>Public Health: (continued)</p> <ul style="list-style-type: none"> - Department of Medical Sciences - Department of Medical Services / Occupational Medicine Center, Nopparatrajathanee Hospital - Food and Drug Administration (FDA) 	<ul style="list-style-type: none"> - Chemical information technologists, Chemists (waste treatment and management) - Toxicologists - Physicians, Pharmacists, Toxicologists, Nutritional scientists, Food technologists, Policy analysts, Public relations officers 	<ul style="list-style-type: none"> - Chemical information management technology, Chemicals laboratory waste management technology, Risk assessment and management, Laboratory reagent recycling technology - Health risk assessment / management / communication, GHS, Inspection, Epidemiology, Regulatory toxicology, Clinical trial and experimental design, Veterinary medicine, Logistics of consumer products, Information management, Public policy administration and analysis

Table12.B: Resources Needed by Government Institutions to Fulfill Responsibilities Related to Chemical Management (continued)

Ministry/Agency Concerned	Number/Type of Professional Staff Needed	Training Requirements
Research Institute - Chulabhorn Research Institute (CRI)	- Environmental toxicologists, Environmental biotechnologists, Environmental Chemists, Molecular biologists	- No requirement, but the CRI has training facilities and courses for interested persons in Thailand and neighboring countries.
Transport	- No requirement.	

12.2 Comments and Analysis

According to current chemical management scheme in Thailand, different ministries hold their respective experts, and resource people responsible for controlling chemicals of diverse types and stages. In Ministry of Agriculture and Cooperatives, there are resource people having in-depth technical and administrative understanding of agricultural chemical management. Whereas, the expertise available in Ministry of Industry is mainly in the administration of industrial chemicals. Additionally, Ministry of Public Health has a number of administrative and professional staff for manipulating consumer chemicals, investigating chemical-related health impacts, conducting disease prevention and related public education, as well as delivering health treatment. With regards to environmental issues, Ministry of Natural Resources and Environment occupies specialists engaged in pollution control and environmental management of hazardous wastes.

After the economic crisis in 1997 and subsequent public sector reforms, the government agencies have reduced the number of public officers. This also affects professionals involved in chemical management, the number seems to be inadequate and can not meet the demand for responding to current challenges. Therefore, in order to enhance efficiency, effectiveness and quality of works, existing personnel in public sector call for capacity building in terms of managerial and technical skills. Human resource mobilization and alliance development among concerned governmental agencies are other efforts to make the most of existing manpower and capacity in carrying out agenda-based work of chemical management that needs inter-sectoral partnership and commitments. Furthermore, in order to overcome workforce and expertise limitation, some government agencies have recruited external experts, academic and research institutions to provide advisory supports in undertaking specific tasks.

In order to boost the performance of concerned governmental agencies in chemical management, and keep Thailand in the mainstream of global movement for chemical safety, the following education and training programs should be given priority:

- Health and environmental risk assessment / management / communication
- Logistics of chemicals and related products
- Information management and Geographical Information System (GIS)
- Chemical accident management and emergency response
- Hazardous waste management
- Clean-up technology for environmental contaminants
- Chemical-related conventions and international agreements
- Socio-economic and policy analysis pertaining to chemical management.

ANNEX 1

Acronyms

AAN	Alternative Agriculture Network
AAS-HS	Atomic Absorption Spectrophotometer
ACCSQ	ASEAN Consultative Committee for Standards and Quality
ADB	Asian Development Bank
ADI	Acceptable Daily Intake
ADRs	Adverse drug reactions
AOAC	The Association of Analytical Communities
APEC	Asia-Pacific Economic Cooperation
ATSD	Agricultural Toxic Substances Division
BE	Bureau of Epidemiology
BIOTEC	National Centre for Genetic Engineering and Biotechnology
BLQS	Bureau of Laboratory Quality Standard
BMA	Bangkok Metropolitan Administration
BOED	Bureau of Occupational and Environmental Disease
BOD	Biochemical Oxygen Demand
CAIN	Campaign for Alternative Industry Network
CAMEO	Computer-Aided Management of Emergency Operations
CCIS	Computerised Clinical Information Systems
CDRTA	Chemical Department of Royal Thai Army
CODEX	The Codex Alimentarius Commission is a subsidiary body of the Food and Agriculture Organization and the World Health Organization of the United Nations.
CRI	Chulabhorn Research Institute
CSD	Commission for Sustainable development
CT	Cleaner Technology
CTC	Committee on Toxic Chemicals
CU	Chulalongkorn University
DANCED	Danish Co-operation on Environment and Development
DANIDA	Danish International Development Assistance
DNA	Designated National Authority
DDC	Department of Disease Control
DEQP	Department of Environmental Quality Promotion
DIW	Department of Industrial Works
DLPW	Department of Labour Protection and Welfare
DO	Dissolved Oxygen
DOA	Department of Agriculture
DOAE	Department of Agricultural Extension

DOH	Department of Health
DMR	Department of Mineral Resources
DMS	Department of Medical Services
DMSC	Department of Medical Sciences
DSS	Department of Science Service
EPPO	Energy Policy and Planning Office
ERTC	Environmental Research and Training Centre
FAAS	Flame Atomic Absorption Spectrophotometer
FAO	Food and Agriculture Organisation
FCB	Fecal Coliform Bacteria
FDA	Food and Drug Administration
FTI	The Federation of Thai Industries
FTIR	Fourier Transform Infrared Spectrophotometer
FWF	Friends of Women Foundation
GATT	General Agreement on Trade and Tariffs
GC/ECD	Gas Chromatograph with Electron Capture Detector
GC/FID	Gas Chromatograph with Flame Ionization Detector
GC/FPD	Gas Chromatograph with Flame Photometric Detector
GC/NPD	Gas Chromatograph with Nitrogen Phosphorous Detector
GC/TCD	Gas Chromatograph with Thermal Conductivity Detector
GC/TEA	Gas Chromatograph with Thermal Energy Analyzer
GC/MSD	Gas Chromatograph – Mass Selective Detector
GC/MS	Gas Chromatograph – Mass Spectrometer
GC/MS/MS	Gas Chromatograph – Mass Spectrometer – Mass Spectrometer
GCP	Good Clinical Practices
GDP	Gross Domestic Products
GFAAS	Graphite Furnace Atomic Absorption Spectrophotometer
GHS	Globally Harmonized System of classification and labelling of Chemicals
GIS	Geographical Information System
GLP	Good Laboratory Practice
GMP	Good Manufacturing Practices
GPO	Government Pharmaceutical Organization
GTZ	German Technical Cooperation
HPLC	High Performance Liquid Chromatograph
HPLC/PDA	High Performance Liquid Chromatograph – Photodiode Array Detector
HSA	Hazardous Substance Act
HSRI	Health System Research Institute
HSRO	Health System Reform Office

HSWMD	Hazardous Substances and Waste Management Division
IAEA	International Atomic Energy Agency
IC	Ion Chromatograph
ICP-AES	Induced Couple Plasma – Atomic Emission Spectrophotometer
ICP-MS	Induced Couple Plasma – Mass Spectrometer
IEAT	The Industrial Estate Authority of Thailand
IE/PAC	Industry and Environment Programme Activity Centre
IFCS	Intergovernmental Forum on Chemical Safety
ILO	International Labour Organization
IMDG-code	International Maritime Dangerous Goods code
INCB	UN International Narcotics Control Board
IOC	Intergovernmental Oceanographic Commission
IOMC	Inter-Organization Programme for the Sound Management of Chemicals
IPCS	International Programme on Chemical Safety
IR	Infra Red Spectrophotometer
IRPTC	International Register of Potentially Toxic Chemicals
ISIC	International Standard Industrial Classification
ISO	International Organization for Standardization
IUCLID	International Uniform Chemical Information Database
IWTI	Industrial Water Technology Institute
JESC	Japan Environmental Sanitation Centre
JICA	Japanese International Cooperation Agency
KU	Kasetsart University
LC/MS	High Performance Liquid Chromatograph – Mass Spectrometer
LC/MS/MS	High Performance Liquid Chromatograph – Mass Spectrometer – Mass Spectrometer
LDD	Land Development Department
LPG	Liquid Petroleum Gas
MOAC	Ministry of Agriculture and Cooperatives
MOC	Ministry of Commerce
MOE	Ministry of Energy
MOF	Ministry of Finance
MOFA	Ministry of Foreign Affairs
MOI	Ministry of Industry
MOJ	Ministry of Justice
MOPH	Ministry of Public Health
MONRE	Ministry of Natural Resources and Environment
MOST	Ministry of Science and Technology
MOTC	Ministry of Transports and Communications

MRLs	Maximum Residue Limits
MSDS	Material Safety Data Sheet
MSW	Municipal Solid Waste
MTEC	National Metal and Materials Technology Centre
MU	Mahidol University
MWA	The Metropolitan Waterworks Authority
NEDO	New Energy and Industrial Technology Development Organisation
NESDB	National Economic and Social Development Board
NCWG	National Co-Ordinating Working Group
NGO	Non-Governmental Organization
NHSRC	National Health Systems Reform Committee
NICE	National Institute of the Improvement of Working Conditions and Environment
NIP	National Implementation Plan
NMP	National Master Plan on Chemical Management
NMR	Nuclear Magnetic Resonance Spectrometer
NRC-EHWM	National Research Center for Environmental and Hazardous Waste Management
NSTDA	National Science and Technology Development Agency
OARD	Office of Agricultural Research and Development
ODSs	Ozone-Depleting Substances
OECC	Overseas Environmental Cooperation Centre
OECD	Organization for Economic Co-operation and Development
OIE	Office of Industrial Economics
ONCB	Office of the Narcotics Control Board
ONEP	Office of the Natural Resources and Environmental Policy and Planning
OOAFP	Office of Atoms for Peace
OPCW	Organisation for Prohibition of Chemical Weapons
OSH	Occupational Safety and Health
PCD	Pollution Control Department
PCR	Polymerase Chain Reaction
PIC	Prior Informed Consent
PM ₁₀	Particulate Matter with diameter less than 10 microns
POPs	Persistent Organic Pollutants
PRTRs	Pollutant Release and Transfer Registers
PSU	Prince of Songkla University
PRTR	Pollutants Release and Transfer Register
RFD	The Royal Forest Department

SIDA	Swedish International Development Cooperation Agency
SOLAS	Safety of Life at Sea
SSO	Social Security Office
SU	Silapakorn University
TEI	Thailand Environment Institute
ThaiHealth	Thai Health Promotion Foundation
TISI	Thai Industrial Standards Institute
TRF	The Thailand Research Fund
TSP	Total Suspended Particulate Matter
VOCs	Volatile Organic Compounds
UNCED	United Nations Conference on Environment and Development
UNDP	United Nations Development Programme
UNEP	United Nations Environment Programme
UNIDO	United Nations Industrial Development Organization
UNITAR	United Nations Institute for Training and Research
UNU	United Nations University
US EPA	United States Environmental Protection Agency
US NIOSH	United States National Institute for Occupational Safety and Health
UV-VIS	Ultra Violet – Visible Spectrophotometer
WEPT	The Council of Work and Environment Related Patient Network of Thailand
WESTPAC	Sub-commission for the Western Pacific
WHO	World Health Organisation
WTO	World Trade Organisation

ANNEX 2

Glossary of Terms

Agricultural chemical: any chemical compound or mixture used to increase the productivity and quality of farm crops, including fertilizers, pesticides and plant growth regulators.

Consumer chemical: any chemical whose products are meant for direct or immediate use by consumers, including household pesticides, cleaning agents, hygienic items, cosmetic items, food additives and medicinal drugs etc.

Fertilizer: any substance that provides nutrients to plants. Some, such as manure nitrogen, phosphorus, potassium and other micro nutrients are natural; others are human-made or synthetic.

Formulation: the selection of components of a product formula or mixture to provide optimum specific properties for the end use desire.

Environmental impact assessment: a systematic examination conducted to determine whether or not a proposed project or alteration or modification to an existing project or alternatives may have significant adverse or beneficial impact on the environment.

Industrial chemical: large scale commercially manufactured chemical compound either organic or inorganic, which may be used directly or make to undergo further transformation in the production of detergents, drugs, fertilizers, perfumes, plastics and other synthetic finished chemical products.

License: an official document issued to enterprises (producers, wholesalers, distributors, importers, exporters, possessors) to allow them to operate dealing with chemicals.

Certificate of Registration, Permit: an official written approval for chemicals to be produced, formulated, imported, exported, or distributed by enterprises.

Pesticide: any substance, organic, or inorganic, used to destroy or inhibit the action of plant or animal pests; the term thus includes insecticides, herbicides, rodenticides, miticides, etc.

Pollution Control: all interventions that maintain the quantities of possible contaminants at the lowest level in a particular environment.

Prior Informed Consent: the principle for international shipment of a pesticide that is banned or severely restricted.

Production: all activities concerning the manufacture of goods/chemicals.

Risk assessment: the identification of environmental / health hazard, their adverse effects, target populations, and conditions of exposure.

Rural area: a potential location generally situated in a remote area or with low population density, where people are engaged predominantly in agricultural activities.

Trade: engagement in buying and selling of commodities including export, import domestic distribution.

Urban area: a potential location with high population density where industries generally situated, particularly Bangkok and the vicinity.

ANNEX 3
List of Concerned Agencies

Government Agencies

Agency	Address	Tel	website
Agricultural Production Science Research Development Office / Department of Agriculture	50 Phahol yothin Rd., Ladyao, Chatuchak, Bangkok 10900	0 2940 5992	www.doa.go.th
Bureau of Drug and Narcotics/ Department of Medical Sciences	88/7 Tiwanon Rd., Taladkwan, Nonthaburi 11000	0 2950 000 ext. 99130	www.dmsc.moph.go.th
Bureau of Epidemiology/ Department of Disease Control	1 Tiwanon Rd., Mueang, Nonthaburi 11000	0 2590 1724	www-ddc.moph.go.th
Bureau of Solid Waste and Hazardous Substances/ Department of Pollution Control	92 Phahol Yothin Rd., Soi 7 ,Sam Sen Nai Phaya Thai, Bangkok 10400	0 2298 2457	www.pcd.go.th
Chemistry Division / Department of Science Service	75/7 Rama VI Rd., Ratcahthevi, Bangkok, 10400	0 2201 7220	www.dss.go.th
Department of Agricultural Extension	2143/1 Phahol Yothin Rd., Chatuchak, Bangkok 10900	0 2579 5178	www.doea.go.th
Department of Health	88/22 Tiwanon Rd., Taladkwan, Nonthaburi 11000	0 2590 4000	www.anamai.moph.go.th
Department of Industrial Works	75/6 Rama VI Rd., Ratcahthevi, Bangkok, 10400	0 2202 4000	www.diw.go.th
Department of International Organization	Ministry of Foreign Affairs Sri Ayudhya Road, Bangkok 10400	0 2643 5078	www.mfa.go.th

Agency	Address	Tel	website
Division of Biological Products/ Department of Medical Sciences	88/7 Tiwanon Rd, Taladkwan, Mueang, Nonthaburi 11000	0 2591 5448	www.dmsc.moph.go.th
Division of Cosmetics and Hazardous Substances/ Department of Medical Sciences	14Tiwanon, Tiwanon Rd., Taladkwan, , Mueang Nonthaburi 11000	0 2951 0000 ext. 99741	www.dmsc.moph.go.th
Division of Laboratory/ Department of Excise	1888 Nachornchaisri Rd., Dusit, Bangkok 10300	0 241 5600 - 19	
Food and Drug Administration	88/24 Tiwanon Rd., Taladkwan, Mueang , Nonthaburi 11000	0 2590 7289	www.fda.moph.go.th
Information System Centre/ Department of Industrial Works	75/6 Rama VI Rd., Rajathevee, Bangkok 10400	0 2202 4133	www.diw.go.th
National Bureau of Agricultural Commodity and Food Standards (AFCS)	3 Rajadamnern Nok Avenue, Baan Phan Thom, Phra Nakhon, Bangkok 10200	0 2280 3887	www.acfs.go.th
National Statistical Office	Larn Lung Rd., Wat Sommanus, Pom Prab Sattru Phai, Bangkok 10100	0 2281 0333 ext. 1410	www.nso.go.th
Narcotics Analysis and Technical Services Institute/ Department of Justice	5 Din-daend Rd., Sam Sen Nai, Phaya Thai, Bangkok 10400	0 2247 0901 - 19	
Office of Agricultural Regulatory/ Department of Agriculture	50 Phahol Yothin Rd., Ladyao, Chatuchak, Bangkok 10900		www.doa.go.th
Office of National Environmental Board	60/1 Rama VI Rd., Phaya Thai, Bangkok 10400	0 2278 5468	
Office of Natural Resources and Environmental Policy and Planning	60/1 Rama VI Rd., Phaya Thai, Bangkok 10400	0 2278 5498	www.onep.go.th

Government Agencies (continued)

Agency	Address	Tel	website
8th Office of Disease Prevention and Control- Nakhon Sawan Province/ Department of Disease Control	516/66 Phahol Yothin Rd., Mueang , Nakornsawan 60000	056 221 822	http://dpc.8.ddc.moph.go.th
9th Office of Disease Prevention and Control- Phisanulok Province/ Department of Disease Control	306 Moo 5, Mueang, Phisanulok 65000	0 5521 4615	
Port Authority of Thailand	444 Tarua Rd., KlongToei, Bangkok 10110	0 2269 3888	www.port.co.th
Regional Medical Sciences Centre- Trang Province/ Department of Medical Sciences	153 Trang-Palian Rd., Ban Khum, Mueang, Trang 92000	0 7521 3104 - 7	
Regional Medical Sciences Centre- Samut Songkhram Province/ Department of Medical Sciences	136 Ekachai Rd., Ladyai, Mueang, Samut Songkharn 75000	034 720 668 - 71	
Regional Medical Sciences Centre- Ubonratchathanee Province/ Department of Medical Sciences	82 Moo 11 Klang Arwuth Rd., Khamuai, Ubonratchathanee 34000	0 453 12230 - 3 ext. 202	
Regional Medical Sciences Centre- Nakhon Sawan Province/ Department of Medical Sciences	2 Moo 4, Tha Nam O, Phayaha Kiri, Nakhon Sawan 60130	0 5626 7423	
Regional Medical Sciences Centre- Pitsanulok Province/ Department of Medical Sciences	Moo 5, Hua Raw, Mueang, Pitsanulok 65000	0 5524 7580 - 2	
Regional Medical Sciences Centre- Udonthani Province/ Department of Medical Sciences	54 Moo1 Nong Pai, Udonthani 41330	0 4220 7364 - 6	
Regional Medical Sciences Centre- Chiangrai Province/ Department of Medical Sciences	148 Phahol Yothin Rd., Nauglae, Mueang, Chiangrai 57100	0 5379 3149 - 50	

Government Agencies (continued)

Agency	Address	Tel	website
Sanitation and Health Impact Assessment Division/ Department of Health	88/22 Tiwanon Rd., Taladkwan, Mueang, Nonthaburi 11000	0 2590 4343	www.anamai.moph.go.th/san/
The Customs Department	1 Soonthronsuksa Rd., Klong Toei, Bangkok 10110	0 2249 4339	www.customs.go.th
The National Institute for the Improvement of Working Condition and Environment/ Department of Labour Protection and Welfare	22/22 Baromrajchonnee Rd., Chim-plee Taling-chan, Bangkok 10170	0 2448 9167	www.nice.labour.go.th

Non-Government Organizations

Organization	Address	Tel	website
Alternative Agriculture Networks	912 Soi Ngamwongwan 31, Ngamwongwan Rd., Mueang, Nonthaburi 11000	0 2591 1195 - 6	www.thaiaan.net
Chemical Business Association	4-6-8 Asoke-Dindang Rd., Bangkapi, Huaykwang, Bangkok 10320	0 2641 5720	www.cba.or.th
Chemical Industry Club/ The Federation of Thai Industries	4th Floor Zone C, Queen Sirikit National Convention Centre, 60 New Rachadapisek Rd., Klong toei, Bangkok 10110	0 2229 4255	www.fti.or.th
Committee of Toxic Chemicals	8018 Ngamwongwan Rd. Soi 27, Bangkhaen, Bangkok 11000	0 2952 7606	
Greenpeace (Southeast Asia)	Room C202 Soi Sailom, Phahol Yothin 8, Sam Saen nai, Phaya Thai, Bangkok 10400	0 2272 7100 - 2	www.greenpeace.org/seasia/th/
Institute for a Sustainable Agriculture Community	363 Chiang Mai-Meajo Rd., Nongjom, Sansai, Chiang Mai 50210	0 5335 4053 - 4	
Khao Kwan Foundation	13/1 Tesaban Thasadet 1 Rd., Soi 6, Sarkaew, Mueang, Suphanburi 72230	0 3559 1793	
Occupational Health and Safety at Work Association	420/1 Building 2 6th Floor, Faculty of Public Health, Mahidol University, Bangkok 10400	0 2644 4067	

Non-Government Organizations (continued)

Organization	Address	Tel	website
Folk Doctor Foundation	36/6 Soi Pradhipata 10, Pradhipata Rd., Saen nai, Phaya Thai, Bangkok 10400	0 2278 1616	www.doctor.or.th
Foundation for Consumers	211/2 Soi 31 Ngamwongwan Rd., Mueang, Nonthaburi 11000	0 2952 5060 -1	www.consumerthai.org
Organic Farming Network of Thailand	65/45 Nawamin 44 Rd., Klongkum, Bungkum, Bangkok 10240	0 2733 6063	
Thai Crop Protection Association/ Crop Life Asia	Rasa Tower, 555 Phahol Yothin Rd., Chatuchak , Bangkok 10900	0 2937 0487	www.tcpa.or.th
The Toxicological Society of Thailand	National Institute of Health, Department of Medical Sciences, Tiwanon Rd., Nonthaburi 11000	0 2951 0000 ext. 99704, 99717	
The Industrial Environmental Institute / The Federation of Thai Industries	4th Floor Zone C, Queen Sirikit National Convention Centre, 60 New Rachadapisek Rd., Klong toei, Bangkok 10110	0 2345 1261 – 4	www.fti.or.th
The Council of Work and Environment related Patients Network of Thailand (WEPT)	70/53 Tiwanon Rd., Nonthaburi 11000	02 951 2710	www.wept.org

Research Institutes

Institute	Address	Tel	website
Chulabhorn Research Institute	54 Moo 4 Vipavadee Rangsit Highway, Thoongsonghong, Lak Si, Bangkok 10210	0 2574 0622 ext. 3927	www.cri.or.th
Faculty of Engineering / Chulalongkorn University	Phaya Thai Rd., Pathum Wan, Bangkok 10330	0 2218 6677	www.eng.chula.ac.th
Electrical and Electronics Institute	975 Moo 4, Sukhumvit 37 Rd., Praksa, Mueang, Samutprakarn, 10280	0 2709 7860 – 8 ext. 108	www.thaieei.com
Environmental Research Institute / Chulalongkorn University	Building 2, Phaya Thai Rd., Pathum Wan, Bangkok 10330	0 2218 8211	www.eric.chula.ac.th
Health System Research Institute	505 A.I. Nont Building 5th, Tiwanon Rd., Nonthaburi 11000	0 2951 0117	www.hsri.or.th
Institute of Health Research / Chulalongkorn University	254 Phaya Thai Rd., Wangmai, Phathum Wan, Bangkok 10330	0 2218 8152	www.ihr.chula.ac.th
Faculty of Engineering / Khonkaen University	128/1170 Mitraparp Rd., Ni-Mueang, Khaon Kaen 60002		
Faculty of Sciences / Khonkaen University	128/1170 Mitraparp Rd., Ni-Mueang, Khaon Kaen 60002	0 4320 2222 - 41	
Faculty of Sciences / Mahidol University	Rama Vi Rd., Ratchathevee, Bangkok, 10400	0 2201 5110	
National Centre for Genetic Engineering and Biotechnology (BIOTEC)	113 Thailand Science Park, Phahol Yothin Rd., Klongneung, Klomgluang, Pratumtanee 12120	0 2564 6700 ext.3212	www.biotech.or.th
National Food Institute	2008 Soi Charansanitwong 40, Charansanitwong Rd., Bangyeekhan, Bang Phlat, Bangkok 10700	0 2886 8088 ext.513	www.nfi.or.th

Research Institutes (continued)

Institute	Address	Tel	website
National Institute of Health	88/7 Tiwanon Rd., Taladkwan, Mueang, Nonthaburi 11000	0 2951 0000	www.dmsc.moph.go.th
National Metal and Materials Technology Center (MTEC)	114 Thailand Science Park, Phahol Yothin Rd., Klongneung, Klomgluang, Pratumtanee 12120	0 2564 6500	www.mtec.or.th
National Research Centre for Environmental and Hazardous Waste management (NRC-EHWM) / Chulalongkorn University	Vidyabthna Building 6th, Phaya Thai Rd., Pathum Wan, Bangkok 10330	0 2218 3951	www.nrc-ehwm.chula.ac.th
Department of Chemical Engineering / Prince Songkla University	15 Kanjanawanich Rd., Kor Hong, Hat Yai, Songkla 90112	0 7427 7291	
Thailand Environment Institute (TEI)	16/151-4 Muang Thong Tani, Bond Street, Bangpood, Pakkred, Bangkok 11120	0 2504 4786	www.tei.or.th
Faculty of Science and Technology / Thammasat University	99 Moo 18 Phahol Yothin Rd., Khlong Nuang, Khlong Laung, Phatumthani 12121	0 2564 4483	
Thai Automotive Institute	65, Sukhumvit 34Rd., Bangpoo Mai, Mueang, Samutprakarn, 10280	0 23240710	www.thaiauto.or.th
Thai Health Promotion Foundation	979/116-120 S.M.Tower Phahol Yothin Rd., Sam Sen Nai, Phaya Thai, Bangkok 10400	0-2298-0500	www.thaihealth.or.th
The Thailand Research Fund (TRF)	979/17-21 S.M.Tower Phahol Yothin Rd., Sam Sen Nai, Phaya Thai, Bangkok 10400	0 2298 0455 ext. 121	www.trf.or.th

Private Organizations

Organization	Address	Tel	website
Electricity Generation Authority of Thailand	53 Moo 2 Charansanitwong Rd., Bangkrui, Nonthaburi 11130	0 2436 6832	www.egat.co.th
General Environmental Conservation Public Company limited (GENCO)	68/39 Moo 3 Rama II Rd., Samaedum, Bangkhuntien, Bangkok 10150	0 2502 0900 – 97	www.genco.co.th
Technology Promotion Association (Thailand-Japan)	5344 Pattanakarn rd., Suanluang Bangkok 10250	0 2717 3000	www.tpa.or.th

ANNEX 4

Map of Thailand



ANNEX 5

List of Contributors to the development of Thailand Chemicals Management Profile 2005

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