No.

JAPAN INTERNATIONAL COOPERATION AGENCY (JICA)
DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES
OF THE GOVERNMENT OF THE PHILIPPINES

THE STUDY
ON
HAZARDOUS WASTE MANAGEMENT
IN
THE REPUBLIC OF THE PHILIPPINES
(PHASE 1)

FINAL REPORT

(SUMMARY)

JUNE 2001

EX CORPORATION
KOKUSAI KOGYO Co.,Ltd.

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PREFACE

In response to a request from the Government of Republic of the Philippines, the Government of Japan decided to conduct the Study on Industrial Hazardous Waste Management in Republic of the Philippines (Phase1) and the study was implemented by the Japan International Cooperation Agency (JICA).

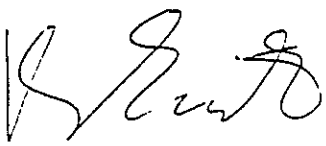
JICA sent a study team, led by Mr. Masato Ohno of EX CORPORATION and organized by EX CORPORATION and KOKUSAI KOGYO Co., Ltd. to Republic of the Philippines 4 times from August 2000 to March 2001.

The team held discussion with the officials concerned of the Government of the Philippines, and conducted related field surveys. After returning to Japan, the team conducted further studies and compiled the final results in this report.

I hope this report will contribute to the promotion of the plan and to the enhancement of friendly relations between our two countries.

I wish to express my sincere appreciation to the officials concerned of the Government of the Philippines for their close cooperation throughout the study.

June 2001



Kunihiko Saito
President
Japan International Cooperation Agency

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ABBREVIATIONS

A	A/C	Authority to Construct
	ADB	Asian Development Bank
	APCD	Air Pollution Control Device
B	BOI	Board of Investments
	BOO	Build-operate-own Scheme
	BOT	Build-operate-transfer Scheme
	BPS	Bureau of Product Standards
C	CALABARZON	CAvite, LAguna, BAtangas, Rizal, QueZON
	CAA	Clean Air Act
	CCI	Chamber of Commerce & Industry
	CCPSP	Coordinating Council for Private Sector Participation, Office of the President
	CP	Cleaner Production
	CY	Calendar Year
D	DANIDA	Danish International Development Agency
	DAO	Department Administration Order
	DBP	Development Bank of the Philippines
	DBM	Department of Budget and Management
	DENR	Department of Environment and Natural Resources
	DILG	Department of Interior and Local Government
	DOE	Department of Energy
	DOH	Department of Health
	DOST	Department of Science and Technology
	DOTC	Department of Transport and Communications
	DPWH	Department of Public Works and Highways
	DTI	Department of Trade and Industry
E	EAP	Environmental Action Plan
	EC	European Commission
	ECC	Environment Compliance Certificate
	EIA	Environmental Impact Assessment
	EIS	Environmental Impact Statement (System)
	EMB	Environmental Management Bureau
	EMB-EQD	EMB Environmental Quality Division
	EMB-HWMS	EMB Hazardous Waste Management Section
	EMPAS	Environment Management & Protected Areas Services
	EMS	Environment Management System
	ENROs	Environment and Natural Resources Offices
	EO	Executive Order

ABBREVIATIONS

	EPMD	Environmental Protection and Monitoring Division
	EPO	Environmental Protection Officers
	EPZ	Export Processing Zones
	EPZA	Export Processing Zones Authority (now PEZA)
	ERF	Environmental Revolving Fund
F	FC	Presidential Committee on Flagship Programs and Projects
	FIS	Filipino Inventors Society
G	GCMCC	Government Corporations Monitoring and Coordinating Council, Office of the President
	GEF	Global Environment Fund
	GTZ	German Agency for Technical Assistance
H	HWM	Hazardous Waste Management
	HWMS-EQD	Hazardous Waste Management Section - Environmental Quality Division
	HWTS	Hazardous Waste Tracking System
I	IATAC	Inter-Agency Technical Advisory Council
	IDRC	International Development Research Center
	IEC	Information, Education & Communication
	IEMP	Industrial Environmental Management Project
	IFC	International Finance Corporation
	IISE	International Initiatives for a Sustainable Environment
	IPP	Investment Priorities Plan
	IRR	Implementing Rules and Regulations
	ITDI	Industrial Technology Development Institute
J	JBIC	Japan Bank for International Cooperation
K	KfW	German Development Bank
	KRA	Key Result Area
L	LGU	Local Government Unit
	LLDA	Laguna Lake Development Authority
M	MBIs	Market Based Instruments
	MEIP	Metropolitan Environmental Improvement Program
	MIF	Model Integrated Hazardous Waste Treatment Facility
	MMDA	Metropolitan Manila Development Authority
	MOOE	Maintenance and Other Operating Expenses
	MWSS	The Metropolitan Waterworks and Sewerage System
N	NCR	National Capital Region
	NEDA	National Economic and Development Authority
	NEDA-PIS	NEDA Public Investment Staff
	NEDO	New Energy Development Organization

ABBREVIATIONS

	NIMBY	Not-in-my-backyard (syndrome)
	NIMTOO	Not-in-my-term-of-office (syndrome)
	NPC	National Power Corporation
	NRDC	National Resources Development Corporation
	NSO	National Statistics Office
O	OJT	On-the-Job-Training
P	PAB	Pollution Adjudication Board
	PBE	Philippine Business for the Environment
	PCAPI	The Pollution Control Association for the Philippines Industry
	PCO	Pollution Control Officer
	PD	Presidential Decree
	PEPP	Philippine Environmental Partnership Programs
	PEZA	Philippines Economic Zone Authority
	PHP	Philippine Pesos
	PIC	Prior-Informed-Consent
	PMO- PTFWM	Project Management Office-Presidential Task Force on Waste management
	PNB	Philippine National Bank
	PNP	Philippine National Police
	PO	People's Organization
	P/O	Permit to Operate
	POPs	Persistent Organic Pollutants
	PPP	Polluters Pays Principle
	PRIME	Private Sector Partnership in Managing Environment
R	RA	Republic Act
	REDs	Regional Executive Directors
S	SMEs	Small and Medium Enterprises
	SS	Suspended Substances
	SWM	Solid Waste Management
T	THW	Toxic and Hazardous Waste
	THWMS	Toxic and Hazardous Waste Management System
	TOC	Total of Organically bound Carbon
	TSD	Treatment, Storage, and Disposal
	TWG-HWM	Technical Working Group on Hazardous Waste Management
U	UNCTAD	United Nations Conference on Trade and Development
	UNDP	United Nations Development Programme
	UNEP	United Nations Environment Programme
	UNIDO	United Nations Industrial Development Organization

ABBREVIATIONS

	USAEP	US Asia Environmental Partnership
	USAID	United States Agency for International Development
W	WTF	Wastewater Treatment Facility
	WTS	Waste Tracking System

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INTRODUCTION

INTRODUCTION

1. Background

With the recent progress in industrialization, industrial waste generation has been increasing in the Republic of the Philippines (hereinafter referred as ROP). Due to the limited capacity for recycling and treatment of the hazardous wastes generated within ROP, industries handling waste acid, waste alkaline, waste oils, and sludge containing heavy metals, in particular, are facing difficulty in managing their hazardous wastes.

ROP enacted the RA6969 (Toxic Substances, Hazardous and Nuclear Waste Act) in 1990. In 1992, implementing Rules and Regulation (IRR), DAO92-29 (Department Administrative Order 29) of the Department of Environment and Natural Resources (hereinafter referred as DENR), was issued for enforcing the RA6969. In addition, systems for Environmental Impact Assessment (EIA) and Environmental Compliance Certificate (ECC) were put in place to lead proper Hazardous Waste (HW) treatment facilities.

However, due partly to insufficient mechanisms of enforcing the RA6969, HW business in the private sector has not grow to meet the demand for proper HW services. Consequently, the flow of HW that complies with the law has not been established completely. In other words, a considerable amount of untreated HW has been stored on-site at the sources since there is no proper HW treatment facility available off-site. Under such conditions, a mass of HW might be improperly treated and dumped, which would be a potential threat to the environment and public health.

The Government of the Philippines (hereinafter referred as GOP) has been promoting foreign investment by creating industrial and free trade areas, called Export Processing Zones (EPZ). Many of the factories started operation in EPZ have been forced to store hazardous wastes generated inside their premises. This is due to the lack of appropriate HW treatment facilities within ROP as well as high costs and long time associated with exporting their HWs for treatment in overseas, if they desire to do so. This situation has resulted in harming not only the environment but also the potential growth of national economy by keeping away foreign investments. This is true when acquiring Environmental Management Certificate, ISO 14001, is becoming increasingly important in the international trade market.

Hence, establishing proper hazardous waste management became one of the most important issues to be solved for achieving environmentally as well as economically

sustainable development in ROP.

Under the situation above, the Government of Japan (hereinafter referred as GOJ) has decided to conduct a master plan study on hazardous waste management as the technical cooperation program of the Japan International Cooperation Agency (JICA) with request/cooperation from GOP.

2. Objective of the Study

The study aims at formulating the master plan for proper management of hazardous waste until the year 2010; including, 1) capacity building of the public institutions, 2) promoting a policy for proper recycling and treatment of HW in the private sector, and 3) a short-term action plan for implementing the master plan which contribute to the promotion of investment and development of industry in ROP in harmony with sustainable environment.

3. Scope of the Study

1) The HW to be covered

The hazardous wastes, except medical wastes, defined and categorized in DAO92-29 of RA6969 are covered in the study.

2) Study Area

The master plan will cover the whole area of ROP, however generator's survey will be focused on Metro Manila and CALABARZON.

4. Key Issues of the Study

The Study focuses on the following issues in formulating the master plan.

I Current Conditions

1. Socioeconomic conditions in ROP
2. HWM in the private sector
3. Foreign donor's assistance to HWM
4. HWM in the neighboring countries
5. Present status of generation, transport, recycling and treatment of HW
6. Present regulatory and administrative mechanisms of HWM
7. Database and data management system
8. Estimates of current and future HW generation

II Master Plan

9. Identification of problems and issues of HWM
10. Basic policies of HW recycling and treatment
11. Basic concept of HW treatment technology and facility development
12. Policies to promote proper HW treatment and recycling at sources
13. Plan to develop a model integrated HW treatment facility
14. Plan to strengthening enforcement of law and administrative capacity concerning HWM
15. Plan to promote the private sector participation in HWM
16. Short-term action plan

5. Organization of the Study Team

The Study Team started its work in September 2000, and collected and analyzed basic information until the end of November 2000. The master plan was prepared from December 2000 to February 2001.

The Study was conducted by GOP and GOJ jointly with the following members.

JICA Study Team	EMB Counterpart
1. OHNO, Masato: Team Leader 2. TANAKA, Tadao: Industrial Waste Treatment Technology (1) 3. ANAI, Junji: Industrial Waste Treatment Technology (2) 4. KIMURA, Toshimune: Hazardous Substance Management Technology (A) 5. TAKANO, Fujio: Hazardous Substance Management Technology (B) 6.NAKAMURA, Shoji: Industrial Waste Monitoring 7. CARDENAS, Marlito L.: Administrative and Regulatory System in Industrial Waste Management 8. WILLIAMS, David G.: Promotion of Industrial Waste Treatment Industry 9. SUGIMOTO, Satoshi: Management /Financial Analysis 10. SATO, Naofumi: Site Evaluation /Database Development 11. ISHIBASHI, Kunito: Industrial Waste Data Management System	1.Mr. Peter Anthony ABAYA: Director 2. Ms. Angelita T. BRABANTE: OIC-Environmental Quality Division 3.Mr. Geri G. R. SANEZ: Chief, Hazardous Waste Management Section 4.Mr. Solon C. RATIVO: Senior Environmental Management Specialist 5.Ms. Leah Aurea U. TEXON: Science Research Specialist II 6. Ms. Elizabeth L.CARINO: Science Research Specialist II 7.Ms. Ma. Resancleire P. Villanueva: Science Research Specialist II

The steering committee by the following member was installed under DENE-EMB in conducting the study.

Members of the Steering Committee

Mr. Arturo Noel Zafra	Philippine Economic Zone Authority (PEZA)
Ms. Clarissa C. Cabacang	Department of Energy (DOE) -EPMD
Mr. Gulllermo Laquindanum	Board of Investments (BOI)
Mr. Joaquin G. Mendoza	Laguna Lake Development Authority (LLDA)
Mr. Rogelio U. Uranza	Metro Manila Development Authority (MMDA)
Ms. Erlinda Gonzales	Environmental Management Bureau Region Ⅳ-A
Mr. Sixto Tolentino	Environmental Management Bureau NCR
Ms. Elainet T. Quintos	Bureau of International Trade Relations

6. Structure of the Report

The report is composed of Volume I (Current Conditions), Volume II (Master Plan), and Annex. For the Annex, the Study Team omitted Japanese version and made out only in English.

The Volume I (Current Condition) is consisted of 5 chapters. In Chapter 1 great contribution of growing electric and electronic machinery sector in generating hazardous wastes is revealed through analysis of basic information of the economy and industry involved in HW generation. Moreover, the Study Team recognizes and points out the importance of foreign capital investment in development of national economy in ROP, as well as the significance of establishing proper HWM to sustain inflow of foreign investment.

The current system on HWM is described in Chapter 2, in which the study team finds HWM system among the generators and treaters has not sufficiently matured. Accordingly, the generators are to develop HWM system through acquisition of ISO14001 certification while the treaters are getting into the recycling business. Also, activities of NGO and the like cannot be ignored in developing HWM in ROP.

Chapter 3 states the present regulatory, administrative and institutional mechanisms on HWM. Although the current laws and regulations do provide a broad framework, details still need to be worked. Likewise, the Study Team also identifies the deficiency of institutional mechanisms and human resources required for implementing the laws.

The Study Team analyzes the current condition and issues on private sector participation in

HWM in Chapter 4. HW generators are mandated to properly treat their HW under the laws. Since treating HW on-site is NOT economically efficient for the generators, they generally seek outside HW treaters to deal with the HW concerns; however, there are not much treatment facilities installed in ROP. Thus, the Study Team points out the reason why law enforcement has not successfully completed, as well as the reason why the characteristics of HW makes the private sector reluctant to invest in HWM business. Additionally, this chapter deals with the present status of policy on economic incentive for promoting HWM in the private sector.

The present status of HW generated by registered generators is referred in Chapter 5, in which the future HW generation amount is estimated based on a summation of verified registration data.

Volume II (Master Plan) is composed of 9 chapters, whose structure is shown in Figure-1.

Chapter 6 identifies the current issues in HWM in the Philippines based on the current conditions analyzed in Volume I so as to incorporate them into the master plan.

Chapter 7 clarifies the basic policy framework of HW recycling and treatment. With an enhancement of the principles in RA6969 and DAO92-29, 'Preventing possible damages on human health and environment, contributing to the development of sustainable society, and no environmental liabilities for the future generation' are agreed policy objectives on HWM. The basic policies to achieve these objectives are given by '3Rs and 1P' policies, namely 1) Reduce (waste minimization and detoxification at sources), 2) Reuse, 3) Recycle, 4) Proper treatment (intermediate treatment to reduce environmental load at final disposal site). The Study Team set up a target to 'establishing HW flow in compliance with landfill standards,' and prepared HWM policy recommendations to achieve the goal.

In Chapter 8, the technical requirements for HW treatment facilities are discussed along with the standards and criteria for HW landfill. Since the establishment of Treatment, Storage and Disposal (TSD) facilities is vital for controlling HW, the basic strategies and plans are laid down for developing the TSD facilities to establish the proper HW flow from sources to recyclers/treaters by the year 2010. The Study Team strongly advises the GOP to involve in the development of TSD facilities as it is an urgent task.

In Chapter 9, the basic principles of HWM is explained, in which HW generators have responsibilities for properly treating their own HWs, whereas the government needs to promote policies for proper treatment of HWs by the generators.

Chapter 10 discusses measures to strengthen laws and regulations and institutional capacity.

They include setting standards of HW treatment, acceptance criteria for a disposal site, technical requirements for TSD facilities, and the like. Also included is the development of electronic database and its management system indispensable for proper HWM.

Chapter 11 examines a development plan of the model integrated TSD facility by the government initiative. The model integrated TSD facility is planned to have a capacity of physicochemical treatment of 3,000 ton/year, thermal treatment of 60 ton/day, and disposal of 10,000 ton/year, and its overall treatment capacity is 20,000 ton/.

Chapter 12 proposes the promotion plan on private sector participation and partnership in TSD facilities development.

The action programs for the period of 2001-2003 that the government needs to tackle are presented in Chapter 13, relating the policies and measures described in chapters 8-12.

Chapter 14 concludes the proposals and recommendations of the Study, including basic plans and action programs that GOP is advised and/or should put efforts immediately.

The Study Team produces Annex in English including the findings in the study as below. In addition, the Study Team has developed the electronic information system to deal with registration and reports of HWM.

ANNEX

Annex1 HW Generation Sources
Annex2 Transporters, Recyclers and Treaters
Annex3 HWM in the Neighboring Countries
Annex4 Initiatives Affecting HWM-Donors, Agencies, Projects
Annex5 Institutional Context and the Private Sector in HWM
Annex6 Analysis of EMB's Organization and Regulatory Activities
Annex7 Monitoring Methodology and Laboratory Analysis of HW
Annex8 Technical Guideline
Annex9 Operation Manual of RA6969, DAO92-29
Annex10 Database and Data management System
Annex11 Forecast of HW Generation Amount
Annex12 Requirements for TSD facilities
Annex13 Site Selection of TSD facilities
Annex14 Database Users' Manual for HWM

1. ECONOMY, INDUSTRY AND HWM IN THE PHILIPPINES

1.1 Economic and Industrial Development in the Philippines

In response to the economic crisis caused by decline in the prices of import and export products in 1980s, the Philippines promoted import substitution industries to protect domestic primary industries. Manufacturing industry was stagnated in this period. The Ramos administration, which had started in 1992, actively promoted export-oriented industry by deregulation of investment, establishment of export products processing zones, and so forth. Also Service industry showed continuous growth in this period and occupied 45% of GDP in 1998.

Manufacturing industry has grown together with the development of the Philippines economy, and particularly, electric and electronic machinery sector, which has played the important role in the export-oriented policy of the Ramos administration and been invested actively, has contributed to the manufacturing industry development. According to the latest data, the shipment value of electric and electronic industry increased by 120% between 1999 and 2000. During 1990-2000, it grew by about six-fold.

The sub-sectors nearly or more than doubled their shipment values during 1990-1995 are ‘Food, Beverage and Tobacco’, ‘Paper, Pulp and Printing’, ‘Chemical Products’, ‘Petrochemical Products’, ‘Non Metal Products’, ‘Non-Ferrous Metals’, ‘Machinery’, ‘Electric/Electronic Machinery’, and ‘Transport Machinery’. These sub-sectors contribute to the economic development of the nation while they increase generation of waste. Naturally, some of these manufacturing industries generate HW as well, and it implies that how to manage HW becomes the issue of primary importance in the Philippines.

The percentage of electric and electronic products reached about 60% of the total export in 1998. They are the best earners of foreign currency in the Philippines.

A series of policies and programs in the Ramos administration, such as deregulation on foreign investment, liberalization of electricity, telecommunication, and financial businesses, promotion of export-oriented industry, have increased the foreign capital investment in the Philippines to create a nationwide booming of investment. Although foreign investment is recently decreasing in value due to shift from large to medium and small size industries, it still plays an important role in the development of domestic economy.

1.2 Economy and Issues of HWM in ROP

Thus, the roles of manufacturing industry in the development of the Philippines' economy are of great importance in view of raising domestic industries as well as expansion of international exports. It also means that proper HWM in these industries is not just the issue of environmental management, but also the issue of economic development in the Philippines. The increasing environmental concerns in the international trade market, represented by worldwide dissemination of ISO14001 and bilateral/multilateral environmental agreement such as NAFTA, will influence the competitiveness of the products in the Philippines in the near future. In this respect, it is necessary to take further steps of proper HWM immediately in the Philippines.

As stated so far, the importance of proper HWM in the Philippines first comes from the protection of human health and environment, but it is also necessary in terms of sustaining and further developing the economy and industry in the Philippines. In this respect, there is no conflict between development and environment concerns. Poor management of HW will destroy the environment as well as economy in the Philippines.

2. PRESENT STATE OF HWM IN THE PHILIPPINES

2.1 HWM at Sources (by Generators)

The JICA Study Team analyzed the present condition of HWM at sources by using 2 measures as follows;

A) HW Registration Data

All the HW generators are required to register with the EMB according to the registration form issued by DENR-EMB. The Study Team analyzed the present condition of HWM at sources based on the analysis result in which the number of generators registered, as of October 2000, is 1,079.

B) Questionnaire and Interview Survey to Generators

Based on about 600 generators in the list of premises located in CALABARZON area provided by EMB, the JICA Study Team selected about 200 generators from the database, considering the need for wide variety and broad representation of industrial categories and types of HW generated and their potential impacts on the environment, and conducted questionnaires and interview surveys to them.

Issues/concerns in HWM at sources were clarified through the survey, as follows;

i) Insufficient registration data from generators
ii) Inaccurate registration data and the existing data not updated
ii) Inadequate recognition on the proper HW recycling and treatment at sources

2.2 Current Conditions of HWM by Private Haulers

2.2.1 HW Haulers

In compliance with the DAO 92-29 series of 1992, Section 27, any individual or entity interested to be a transporter of HW is required to register and must obtain a Transport Permit from the EMB. As of October 2000, 52 enterprises are registered as transporters of hazardous wastes, and independent HW haulers among them are currently 35 registered. The Study Team conducted questionnaire and interview survey to all the haulers registered, and results of the survey are as follows;

- 7 haulers among 35 independent HW haulers has closed down or suspended their services to date.
- There are 2 companies, which collect and export HW to the third countries for recycling and/or treatment. Both of them do not have their own hauling vehicles, but sub-contracted with the forwarding agents for haulage of HW from generators

to the ports.

- There are only 5 haulers who own more than 4 HW hauling vehicles. The actual condition of independent haulers is not revealed since many of other registered haulers do not own their hauling vehicles, but sub-contracted with the forwarding agents.
- The above 5 haulers do not always provide HW hauling services. Instead, they sometimes rent their vehicles to generators, recyclers, or treaters.
- Through the survey, although it seems that generators transports HW from their own facilities to contracted recyclers/treaters or their own treatment facilities, most of them are not included in the registration data in general.

2.2.2 Recyclers, Treaters and Reusers

There are 28 companies registered as recyclers or recyclers/treaters, in which 7 enterprises has closed or suspended their services to date, and 21enterprises are in operation. The following table shows the details of 28 companies registered as recyclers or recyclers/treateras.

Table2.2.1 Details of Recyclers, Treaters and Reusers registered

Classification	Number of Facilities	Type of Waste
Recyclers	9	Solvent, Used Oil, Used Battery, Solder Dross
Recyclers/Treaters	3	Solvent, Inorganic Chemicals, Sludge
Treaters	6	Medical Wastes, Used Oil, Plating Waste Water, Tanker Sludge, Waste Water Treatment Sludge
Reusers (as raw materials and fuel)	3	Mining Sludge, Used Oil, Waste Water Sludge
Under closing or suspending	7	

17 companies, to whom the Study Team conducted questionnaire and interview survey, are located in the CALABARZON or Metro-Manila.

6 companies among the 17 are large-scale but others are relatively small business firms in terms of their HW treatment capacity.

The result of the survey clarified issues on the actual condition of recyclers and treaters, following;

1) Shortage of TSD facilities and extending HW storage

2) Issues on treatment and disposal of hazardous treatment residues
3) Basic factors which impede the formation of business in recycling and treating HW

Since HW treatment and landfill facilities often require highly advanced technologies and large capital investment, it will take much more time to build and operate all these facilities. Therefore, one important issue to be addressed immediately is how to properly store the HW in the transitional period to full-scale development and operation of proper TSD facilities.

2.3 Initiatives Affecting HWM-Donors, NGOs, and Industry Groups

2.3.1 History of Donors' Activities Affecting HWM

Over the past five years, a considerable effort has been put into studies and promotion for industrial pollution control (IPC), and much of these activities have been supported by international and bilateral aid agencies. In particular, a study on hazardous waste management is identified as a high priority matter. Projects closely relating the HWM project are following;

a) Program of World Bank

The World Bank sponsored the Industrial Efficiency and Pollution Control Project (IEPC), in partnership with DENR in 1989 through its Metropolitan Environmental Improvement Program (MEIP).

b) Program of DANIDA

During the 1990s, the Danish government assisted the Pasig River clean-up program, which was recently transferred to the Pasig River Commission, including a database on industries.

c) Program of USAID

After the passage of Toxic and Hazardous Waste Act (RA6969), the USAID, through its Industrial Environment Management Project (IEMP) assisted EMB to prepare implementing regulations and action plan for the Act (DAO 92-29). USAID also supported EMB to construct the present system of the HW registration data and database.

d) Program of UNDP

The UNDP assisted Private Sector Partnership in Managing the Environment (PRIME) project which comprises four modules as follows;

1) Preparation of action plans for the Philippines Business Agenda 21
2) Development of integrated resource recovery systems, and information linkages between firms
3) Aquisition of ISO 14001 certification
4) Reinforcement of environmental monitoring and laboratory services provided at EMB through the private sector

e) Other donors

Other donors have some involvment with HWM projects, showing the following table.

Table-2.3.1 Projects assisted by donors in HWM

Donor's agent	Project
Holland	Study of hospital wastes disposal in Metro-Manila area
UNCTAD	Study on the disposal of lead-acied batteries
UNIDO	Techinical assistance to improve pollution control of tannery wastes
GEF/UNIDO	Study of persistent organic pollutants (POPs)
ADB	Techinical asistance to EMB, DOTC and PNB to strengthen their organization

2.3.2 NGOs' activities

Most of environmental NGOs in the Philippines mainly focus on green environment (natural environment protection and conservation) with some exceptions focusing on brown issues represented by SWM in the Metro-Manila.

As to HWM, there are some NGOs actively involved in brown issues relating to waste management, namely 'The Philippines Business for the Environment (PBE)' and 'The Pollution Control Association for the Philippines Industry (PCAPI)'.

PBE is the one who formulated 'The Philippines Business Agenda 21' while PCAPI operates various education and training courses on cleaner production technology and environmental management system. PCAPI also operates so-called 'Waste Information Exchange Program'.

2.3.3 Industry Groups' Activities

Among the industry groups, the Philippines Chamber of Commerce and Industry (PCCI), is going to be active in environment management activities.

3. PRESENT REGULATORY, ADMINISTRATIVE AND INSTITUTIONAL MECHANISMS

Hazardous waste management in the Philippines can properly and effectively function if there is a sufficiently strong regulatory system put in place and working as intended. The HWM regulatory framework consists of:

- Legal and Policy Framework
- Regulatory Framework
- Administrative Mechanism
- Monitoring and Law Enforcement Mechanism
- Organizational Capacity

The current status of these aspects will be discussed in this chapter.

3.1 Legal and Policy Framework

The present legal and policy framework of HWM derives principally from two bodies of documents, namely: 1) The Philippines Constitution of 1986, 2) Legislations and Administrative Issuances.

The Philippine Constitution of 1986 spells out the basic environmental policy with the following provisions:

(a) Constitutional Policy on Environment,
(b) Constitutional Policy on Resource Utilization,
(c) Constitutional Policy on Due Process and People Participation.

Besides, Five environmental laws highly relevant to HWM are following,

(a) Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (RA6969),
(b) Environmental Impact Statement (EIS) System Decree of 1978,
(c) Pollution Control Decree of 1976,
(d) Clean Air Act of 1999,
(e) Ecological Solid Waste Management Act of 2001.

Main points of the above 5 laws are described as follows;.

(1) Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990 (RA6969)

Enacted in 1990, Republic Act or R.A. 6969 is the principal legislation on hazardous waste management. The Implementing Rules and Regulations (IRR) are spelled out in DENR Administrative Order No. 29, Series of 1992 (DAO 92-29). Five policy thrusts are defined for proper HWM, namely:

(a) Prohibition of HW entry even in transit,
(b) Promotion of waste management hierarchy of minimization (most preferred), recycling and reuse, treatment and disposal (least preferred),
(c) HWM to avoid pollution, danger to the public, harm to plants and animals, or limit the beneficial use of environment,
(d) HW generator's responsibility for proper HWM,
(e) HW generator to pay costs of proper treatment, storage and disposal ("polluter-pays-principle").

(2) Pollution Control Decree of 1976

Issued as Presidential Decree or PD 984, this is the main legislation on managing and controlling air, water and land pollution due to emissions, effluents or discharges from point sources. The IRR were last revised as DAO 93-14 (air quality management) and DAO 94-34 and 94-35 (water quality management).

(3) Environmental Impact Statement System Decree of 1978

The Philippines Environmental Impact Statement (EIS) System Decree (PD 1586) requires development plans, programs and projects to undergo an environmental impact assessment (EIA) process prior to approval and implementation.

Proponents of projects involving the use of toxic substances and generating wastes prescribed by DAO 92-29 are required to undergo an EIA and acquire an Environmental Compliance Certificate (ECC) prior to implementation. In case the project may pose significant public risk, an Environmental Risk Assessment is required as well. A process of public participation and social acceptability is a central requirement of the EIA.

(4) Clean Air Act of 1999

The Clean Air Act (CAA) of 1999 (RA 8749) sets ambient air quality and emissions standards for a number of hazardous substances such as toxic metals and organic compounds such as dioxins and volatile hydrocarbons, and prohibits the use of incinerators which to date have presented a safe and cost-effective option for HWM.

(5) Ecological Solid Waste Management Act of 2001

This most recent environmental law spells out the policy of an integrated, comprehensive and ecological approach to solid waste management (SWM) planning, programming and implementation.

It establishes a National Solid Waste Management Commission, chaired by DENR and co-chaired by a private sector representative. The Commission's secretariat is the EMB. Also to be set up is a National Ecology Center, headed by the EMB Director, to provide consulting, information, training and networking services for implementing the provisions of the act.

3.2 Regulatory Framework

Title III of DAO 92-29 specifically provides a general regulatory framework (see Figure 3.1 below) in order to properly manage and control hazardous wastes.

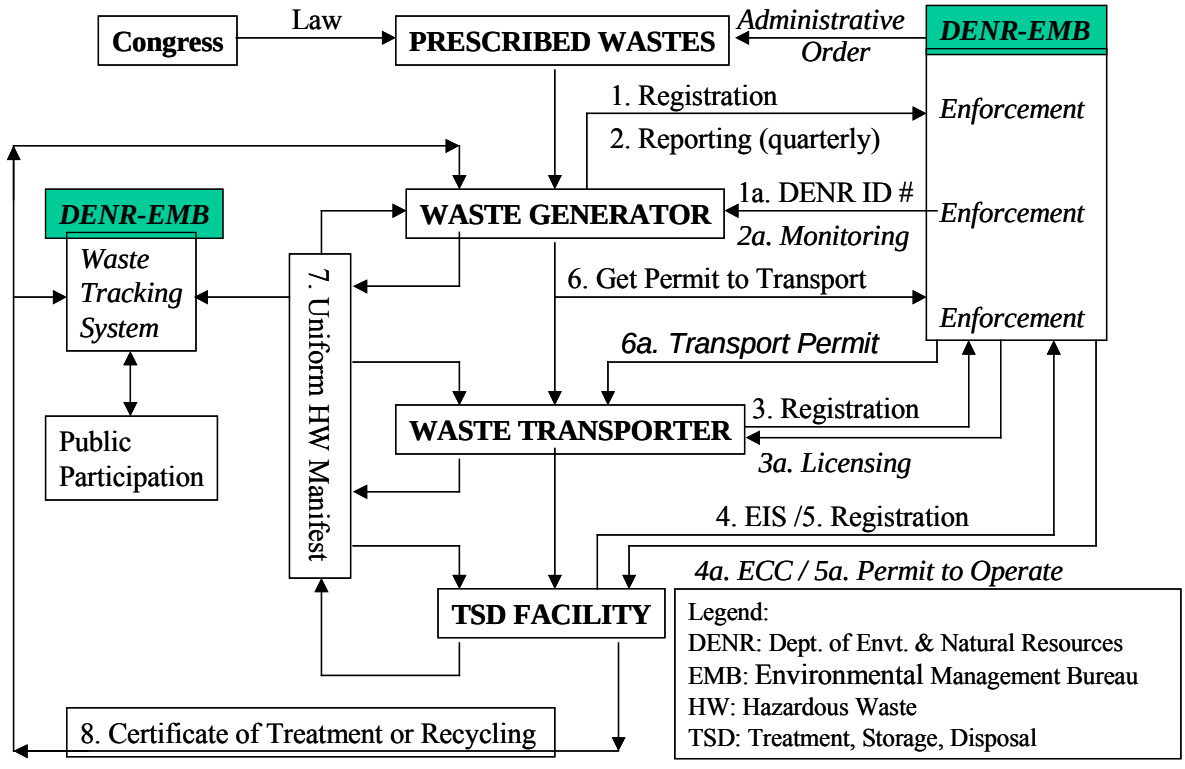


Figure 3.2.1 Regulatory Framework of HWM in the Philippines

The HWM regulatory framework consists of:

a) Policy (DAO 92-29, Section 24) – sets preference for waste minimization and recycling; describes general performance standards, including protection of public

health and natural resources;

b) Classification of HW (DAO 92-29, Section 25) – names broad classes and subcategories of HW streams and exemptions;
c) Waste Generators (DAO 92-29, Section 26) – requires notifying, reporting, planning and training by HW generators;
d) Waste Transporters (DAO 92-29, Section 27);
e) Waste Transport Record or Tracking System (DAO 92-29, Section 28);
f) Waste Treatment, Storage and Disposal Premises (DAO 92-29, Section 30);
g) Import and Export (92-29 Sec. 31, also DAO 92-28 and 94-28).

As defined by RA6969 and DAO92-29, the corresponding key regulatory and administrative tasks include:

1) Notification, registration and reporting of HW generators,
2) Accreditation of HW transporters and issuance of HW transport permit,
3) Permitting of TSD facilities, including recyclers
4) Monitoring of HW using the Waste Tracking System
5) Database Management for the Waste Tracking System
6) Permitting of HW Importation and Exportation
7) Advocacy for effective HWM, including IEC and training
8) Surveillance, Compliance Monitoring and Enforcement
9) Policy research and formulation
10) HWM technology research
11) Establishment and administration of a Special Fund for projects and research.

3.3 Administrative Mechanism

Important procedures of the existing administrative systems are following ;
1) Notification, registration and reporting of HW generators
2) Permitting of HW transport and the waste manifest system
3) Permits of HW treatment, storage and disposal facilities
4) Permits of HW import and export

RA6969 is one of the unfunded laws that it is mandated to implement although the successful implementation of policies on HWM will certainly depend on the funding available. Thus, RA 6969 implementation has not been given separate budget nor plantilla items for staff. This may be one reason why the 10-year old law (passed in 1990) has been hardly implemented so far.

DAO 92-29 provides the fees for transactions on hazardous wastes. The schedule of fees was published recently as Memorandum Circular No. 2000-12.

3.4 Monitoring and Law Enforcement Mechanism

The core of monitoring and law enforcement mechanism is as follows:
1) Hazardous waste tracking system
2) Compliance monitoring, inspection and enforcement
3) Violations, fines and penalties
4) Litigation and prosecution
5) ECC compliance monitoring

The regional monitoring units (RMUs) is designated to do the RA6969 compliance monitoring. DAO92-29 authorizes the DENR Secretary of his representative to monitor and inspect premises and to impose a fine for administrative violations if there are any administrative violations established after due process.

Violations of the Pollution Control Decree of 1976 (PD 984) involving hazardous wastes and substances prescribed by DAO 92-29 are handled by the Pollution Adjudication Board (PAB) which is a quasi-judicial body supervised by DENR and whose secretariat is based at EMB. The PAB can impose administrative fines and penalties and also issue a cease-and-desist order that will effectively close the operations of a polluting firm. However, PAB does not handle criminal offenses arising out of the pollution act under PD 984 nor RA 6969 as these are within the jurisdiction of the regular courts. RA 6969 and DAO 92-29 have gone beyond defining administrative offenses by criminalizing certain violations. However, this provision has not been tested to any noteworthy level and the overall track record of litigation and prosecution in this regard is weak and ineffective for deterring further violations.

Industrial facilities or premises that use toxic chemicals and/or generate hazardous wastes are required to undergo the EIA process and acquire an ECC under PD 1586. The concept and procedure of multipartite monitoring in the EIA system may be explored for application to the case of hazardous waste generators. Furthermore, based on DAO 92-29, the DENR Secretary can appoint Environmental Protection Officers (EPO) to assist him in the proper discharge of his functions under DAO 92-29, but DENR Secretary has not ever appointed EPOs; neither the EMB Director nor the DENR REDs have ever been given official appointments as EPO although these officials have been performing RA6969 tasks as representatives of the Secretary.

3.5 Organizational Capacity of EMB

Recognizing the importance of an effective regulatory system to proper HWM in the country, the JICA Study Team conducted an overall organizational audit of EMB as the HWM-Mandated. The main parameters for evaluation are the functions, structure, budget, key result areas and accomplishment of EMB in the performance of its mandate as required by RA6969 and DAO92-29.

(1) EMB-DENR as the Mandated Agency

The EMB is a new line agency that has a Central Office based at the DENR headquarters and 15 Regional Offices based at the various regional capitals. As a line bureau, the EMB is in a favorable position to develop its institutional capacity for effective hazardous waste management through organizational development measures.

(2) Inter-Agency Coordination and Stakeholder Participation

The assistance of other agencies and the other stakeholders can greatly boost the proper implementation of HWM policies, laws and regulations. DAO92-29 of RA696 provided establishment of the Inter-Agency Technical Advisory Council (IATAC) with duties to assist DENR in formulating rules and regulations for the effective implementation of RA 6969. The IATAC is composed of the following officials or their authorized representatives:

- Secretary of the Department of Environment and Natural Resources (Chairman),
- The respective Secretaries of the Departments of Health, Trade and Industry, Science and Technology, National Defense, Foreign Affairs, Labor and Employment, Finance, and Agriculture,
- The Director of Philippine Nuclear Research Institute,
- Representative from non-governmental organizations on health and safety (to be appointed by the President for a term of 3 years).

A Technical Working Group (TWG) on HWM was established by EMB to provide technical support to the Council, which is rarely convened for 2 or 3 times only in the past.

(3) EMB Central Office

(a) Functions

The major functions of EMB as a staff bureau are mandated in EO 192 as follows:

1. Formulation of possible legislations, policies and guidelines related to pollution control, environmental impact assessment, toxic chemicals and solid and

hazardous wastes management;

2. Formulation of environmental standards on air and water quality, noise, and odor;
3. Technical and laboratory services to support formulation of environmental standards
4. Legal services to support formulation of environmental legislations, policies and guidelines, and adjudication of pollution cases;
5. Environmental information and awareness campaign;
6. Technical assistance to DENR Regional Offices (now transformed to EMB Regional Offices) on the implementation of laws on pollution control, environmental impact assessment and toxic chemicals and solid and hazardous wastes management.

In connection with the last function of providing technical assistance to DENR Regional Offices, EMB as a line bureau can directly enforce environmental laws. The coordination by EMB Regional Directors with DENR Regional Executive Director (RED) on environmental matters remains a key function. The authority to sign and issue Environmental Compliance Certificate (ECC) pursuant to the EIS Decree (PD1586) still rests with the DENR REDs since this function is a delegated authority from the President of the Philippines to the REDs. With the enforcement of the Clean Air Act, the EMB became a line agency and gained the additional function of implementing the Act. Thus, organizationally, EMB is in a flux of transformation from a staff bureau to a line bureau with increased functions, expanded geographical reach, and hopefully also, improved staffing pattern and higher budgetary appropriation.

(b) Structure

The existing structure of the EMB Central Office is shown in Figure 3.5.1. The existing structure is still a carryover from its staff agency structure and shall be transformed into a new one befitting a full-fledged line agency.

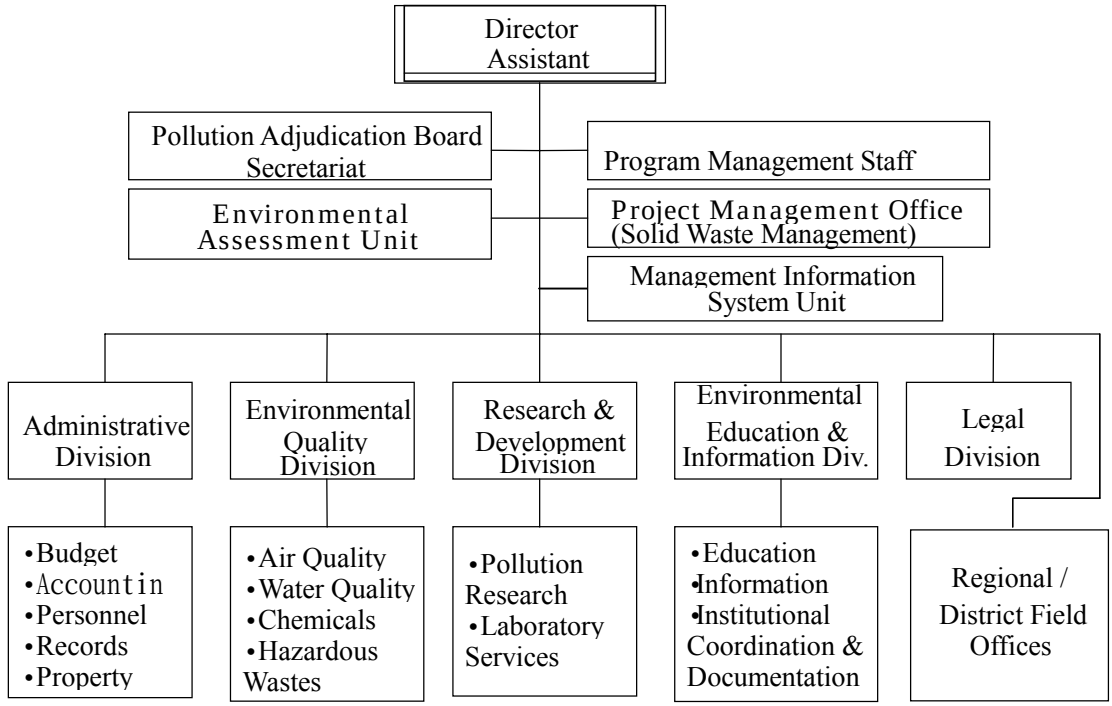


Figure3.5.1 The Existing Structure of the EMB Central Office

The latest proposed structure as a line agency, as of November 2000, is shown in Figure 3.5.2. However, this new organizational transformation has not yet been officially determined in March 2001.

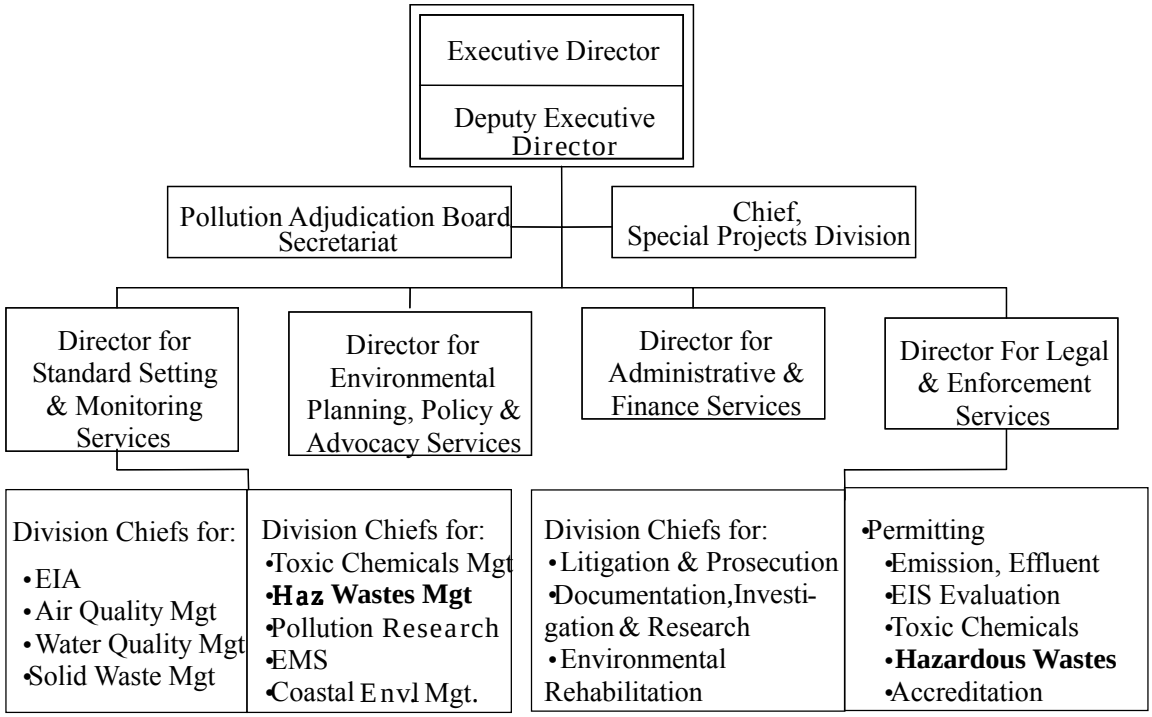


Figure 3.5.2 The Proposed Structure of the EMB Central Office (as of November 2000)

Regular staff is not provided in the two units in charge of implementing RA 6969, which are the Toxic Chemicals and Hazardous Waste Management Sections under the Environmental Quality Division. The staff (and up to 1999 also the budget) of these units are merely "shared" by the other regular units and are much limited compared to the mandated tasks at hand.

(c) Staffing

The HWM function is presently assigned to a specialized section under the Environmental Quality Division (EQD).

The HWMS at the central EMB has presently a total staff of seven persons, a big improvement over the staff number of only two people some three years ago. Four of the staff members are either a chemist or a chemical engineer, one of whom serves as Section Chief. The fifth one is a public administration graduate trained as a HW Materials Handling technician.

(d) Budget

About PHP260 million was allocated to EMB in FY2000. Before its transformation as a line agency in 1999, EMB's share in the total DENR budget was below 2%. With the transfer of operations of DENR field environmental offices to EMB Regional Offices, the EMB share almost doubled in Fiscal Year (FY) 2000. However, and it is still around 4% of the total DENR budget in FY2001.

The situation of the budgetary allocation for hazardous waste management is even more unfavorable. Since the passage of RA6969 in 1990 until 1999, the HWMS received no budget allocation of its own and was merely subsidized by the EMB's budget for operations. In FY 2000, the operations budget for the Project Management Office on solid waste management was shared with the HWMS and Chemicals Management Section. Out of the total EMB budget of PHP127,281 thousand on MOOE basis in 2000, PHP33,446 thousand is allocated for HWM administration.

(e) Equipment and Technical Support

The HWMS has serious handicaps in terms of equipment. Only one working computer and one shared telefax line are available for its technical staff of five. This poses a serious bottleneck in their work and transactions with their clients. For transport, the unit has no vehicle for its own administrative tasks and can only make use of other units' pooled vehicles. EMB has accredited some 20 external laboratories to work on environmental samples, but laboratory facilities and equipment for sampling and analyzing hazardous wastes are limited.

(f) HWM Activities, Accomplishments and Targets

The programs, activities, key result areas and accomplishments of the HWMS-EMB for FY2000 are shown in Table 3.5.1, along with the indicative targets for FY2001 to FY2005.

(g) Policy-Making and Guidelines Preparation

The EMB Central Office is responsible for preparing guidelines to implement the provisions of DAO92-29 and for formulating new policy as needed. This function is important in clarifying implementation and enforcement of provisions of RA6969 and DAO 92-29.

In terms of formulation and finalization of guidelines, HWMS accomplished one guideline (Schedule of Fees) in FY2000. For FY2001, the target is set at 5 guidelines formulated, issued and disseminated. This is a very important function that needs to be further accelerated. The ability of HWMS to tap the field support of the Regional Offices in HWM implementation depends to large extent on availability of clear, easy-to-follow and applicable guidelines.

Table 3.5.1. EMB HWM Accomplishments for the Year 2000 and Targets for Fiscal Years 2001 to 2005 (1)

Key Result Area	Performance Indicator	2000 Target	2000 Accom-plishment	2001 Target	2002 Target	2003 Target	2004 Target	2005 Target
1. Formulation & Finalization of Guidelines	Guideline formulated / finalized							
1.1 Schedule of Fees	Guideline finalized / disseminated	1	1					
1.2 Registration Procedure for TSD Facilities	Guideline formulated / finalized	1	1 formulated					
1.3 Compliance Monitoring Checklist	Guideline formulated / finalized	1	0					
1.4 Updating & Revision of Table 1 of DAO 92-29 on Prescribed HW	Guideline formulated / finalized	1						
1.5 Special Funds	Guideline formulated / finalized	0		1				
1.6 Licensing/Accreditation of HW Transporters	Guideline formulated / finalized	0		1				
1.7 Re-injection of HW into Abandoned Geothermal	Guideline formulated / finalized	0		1				
1.8 Other DAO, MC or guidelines	DAO, MC or Guideline formulated / finalized / disseminated		10	5	5	5	5	5
2. Inspection & Monitoring of HWG & TSD	No. of HWG inspected / monitored	20	25	60				
2.1 Inspection of HWG registrants	No. of HWG facilities inspected			300	450	600	600	600
2.2 Monitoring of registered HWG	No. of HWG facilities monitored			324	594	999	1539	2079
2.3 Inspection of TSD registrants	No. of TSD facilities inspected			25	30	35	40	40
2.4 Monitoring of registered TSD	No. of TSD facilities monitored							
3. Updating of List of HW Generators								
3.1 Processing of HWG registration	No. of registrations processed	1000	442	1,000				
	No. of DENR ID no. issued		442	900				
3.2 Encoding of HWG registrations	No. of new registries encoded in DB	1000	1079	900				
3.3 Evaluation of HWG quarterly reports	No. of quarterly reports reviewed			2158				
3.4 Updating DB with quarterly report data	No. of registries updated in DB	0	0	2158				
3.5 Investigation of possible violations	No. of investigations completed			108				
4. Updating of List of HW Transporters	No. of list set up	1						
	No. of registered transporters	15	56	175	250	300	350	400
5. Updating of List of Treaters & Recyclers	No. of list set up	1						
	No. of registered treaters & recyclers	15		25	30	35	40	40
6. Convening of IATAC-TWG	No. of meetings convened	4		4	4	4	4	4

Table 3.5.1. EMB HWM Accomplishments for the Year 2000 and Targets for Fiscal Years 2001 to 2005 (2)

Key Result Area	Performance Indicator	2000 Target	2000 Accom-plishment	2001 Target	2002 Target	2003 Target	2004 Target	2005 Target
7. Issuance of Permits / Clearances								
7.1 Transport Permit	No. of permits processed / issued	55	204	175	250	300	350	400
7.2 Importation Clearance	No. of clearances processed / issued	12	13	12	12	12	12	12
7.3 Export Clearance	No. of clearances processed / issued	12	13	12	12	12	12	12
7.4 Permit to Construct and Operate TSD Facility	No. of permits processed / issued	0	0	25	30	35	40	40
7.4.1 Treatment Facility only	No. of permits processed / issued							
7.4.2 Storage Facility only	No. of permits processed / issued							
7.4.3 Disposal Facility only	No. of permits processed / issued							
8. Capacity-Building for Regional Offices	No. of trainings conducted	2		10	10	10	10	10
9. Updating / Improvement of HW Database								1
9.1 Redesign of HW Database	Redesigned database	1	1	1	1	1	1	
9.2 Updating of HWG Registration Database	Updated HWG Registration DB	1000	1079	1079	1979	3929	5129	6929
9.3 Setting-Up & Mgt. of Waste Tracking System	WTS set up			1				
9.3.1 Transport Permits Database	Transport Permit DB operational			1	1	1	1	1
9.3.2 Treatment Premises Database	Treatment Premises DB operational			1	1	1	1	1
9.3.3 Storage Facilities Database	Storage Facilities DB operational			1	1	1	1	1
9.3.4 Disposal Facilities Database	Disposal Facilties DB operational			1	1	1	1	1
9.3.5 HW Manifest Databse	HW Manifest DB operational			1	1	1	1	1
9.4 Inspection & Monitoring Reports	Insp'n. & Monitoring DB operational				1	1	1	1
9.5 Sanctions (Notice of Violations, Fines)	Sanctions DB operational				1	1	1	1
9.6 Litigation & Prosecution	Litig'n. & Prosecution DB operational				1	1	1	1
9.7 General Corrspondence and Others	Gen. Correspondence DB operational				1	1	1	1

Table 3.5.1. EMB HWM Accomplishments for the Year 2000 and Targets for Fiscal Years 2001 to 2005 (3)

Key Result Area	Performance Indicator	2000 Target	2000 Accom-plishment	2001 Target	2002 Target	2003 Target	2004 Target	2005 Target
10. Implementation of JICA project on formulation of a National Framework Plan for	Framework Plan prepared	1	ongoing	1				
11. Intervening Activities								
11.1 Written response to inquiries prepared	No. of letters/memoranda prepared		318	500	550	600	650	700
11.2 Public assistance / Help desk	Inquiries addressed		156	125	100	113	125	138
11.3 Aid to legislation	Hearings attended, review prepared		3	10	15	20	25	30
11.4 Resource speaker to seminars/trainings	Lectures delivered		25	25	25	25	25	25
11.5 Participation in HWM seminars	Person-days attended			25	25	25	25	25
11.6 Inter-Agency coordination, meetings	Meetings held		14	15	20	25	25	25
11.7 Aid to litigation & prosecution	Meetings held, Hearings attended			10	15	20	25	30

(h) Registration of HW Generators

The registration activities started in CY 1992 after the promulgation of the IRR (DAO 92-29). The compliance with the registration requirement was however so low, reaching only around 400 registrations by CY 1998. With the increase of the staff from 2 to 5 persons and the renewed campaign in CY 1998, the registration within CY 1999 and 2000 almost tripled the accomplishments over the previous six years (an addition of around 800).

(i) Issuance of Permits

EMB currently issues the following permits relative to DAO92-29: transport permit, importation clearance for recyclable hazardous wastes, export permit and, in very few instances, storage permit. The HWMS issued 204 transport permits in Year 2000 compared to its target of only 55. This figure is expected to increase proportionate to the number of HW generator registrations. The issuance of importation and export clearances is leveled off at 13 and is expected to stay in this range for the next few years as long as agreements under the Basel Convention and government policies on importing recyclable hazardous wastes will not change much.

(j) Facility Inspection, Monitoring and Enforcement

The facility of a HW generator or TSD operator applying for registration and DENR ID number is a candidate for "must"-inspection so that the submitted data can be verified and any deficiency or misrepresentation in the filled-up registration form can be uncovered.

The targets for the inspection and monitoring of HW generators (HWG) and Treatment, Storage and Disposal (TSD) facilities were over-accomplished for the FY2000 (25 facilities accomplished compared to 20 facilities targeted). For FY 2001, the target is being increased to 60 facilities inspected or monitored.

One crucial technical constraint in HWM is the lack of a written protocol for inspection and monitoring of facilities. The current practice is the preparation of a facility- and case-specific plan by the assigned inspection / monitoring team. Due to limited staffing and equipment, the inspections tend to be mere ocular surveys and interviews.

(k) Waste Tracking System and Database Management

The Hazardous Waste Tracking System is currently built around the HW Generators' Database and their Quarterly and Manifest Reports, the Transport Permits issued, TSD facilities inspection reports, reports from the regional monitoring units, and walk-in complaints from the public. The HW Generators' database is the only one that is

computerized, while the other information sets mentioned are manually searched, retrieved and analyzed. The manual filing systems for these information sets are physically difficult to maintain due to the lack of space, staff and systematic procedure.

The expectation and need of the HWMS is to have a management information system that can accommodate the large volume of data and allow manipulation of such data sets to provide the necessary decision support for various aspects of HWM tasks.

(l) Capacity Building for HWM in Regional Offices

The EMB Regional Offices are the field implementers of environmental laws, rules and regulations. However, their expertise, staffing and logistics for implementing RA6969 are severely constrained. The role of the regional offices so far is limited to survey of registrant-generators and monitoring of registered HW generators and the transmittal of the results to EMB Central for proper action. Some regional offices such as NCR and Region IV also conduct the registration and inspection of HW generators.

Thus, the Central Office must be undertaking everything possible to build capacities of its regional staff for RA6969 implementation. In Year 2000, the HWMS managed to conduct only 2 trainings for regional staff that provided general orientation on Title III of DAO92-29.

(m) Intervening Activities, including Networking and IEC Campaign

The HWMS staff reported varied intervening activities in CY 2000. Intervening activities refer to tasks that are not planned but expected to occur on a walk-in basis. These include dealings with the various stakeholders, such as answering queries from the regulated community, maintaining some kind of a helpdesk or assistance to public requests and complaints, technical assistance to law- and policy-making functions of the DENR Secretary or Congress or the President, giving and attending seminars, coordinating with other agencies and industry groups, and assisting prosecutors and attending hearings on violations of RA6969 and DAO92-29, and the like. These tasks may be better categorized the networking and information, education and communications functions of HWMS. Networking with various stakeholders and enhancing their awareness for effective HWM is a key result area of the HWMS and its regional counterparts.

(4) EMB Regional Offices

The EMB Regional Offices were set-up only last year in pursuit of the provisions of the Clean Air Act that mandated the conversion of EMB into a line agency as the lead

implementer of this Act. The EMB Regional Offices were organized out of the environmental management sector of the DENR Regional Offices' Environmental Management and Protected Areas Services (EMPAS). The transfer of staff, budget and equipment from the DENR Regional Offices to EMB Regional Offices is still being completed and formalized at various degrees.

(a) Function and Structure

The EMB Regional Offices, headed by Regional Directors who report to the EMB Director at the Central Office, discharge the mandate of the Bureau at the regional level. The EMB Regional Offices are the frontline implementers of environmental laws, rules and regulations that EMB is mandated to enforce. The existing structure of the EMB Regional Offices (Figure 3.5.3) derives from what was handed down by the respective mother DENR Regional Offices and modified by the nature and extent of merging with EMB as a line agency.

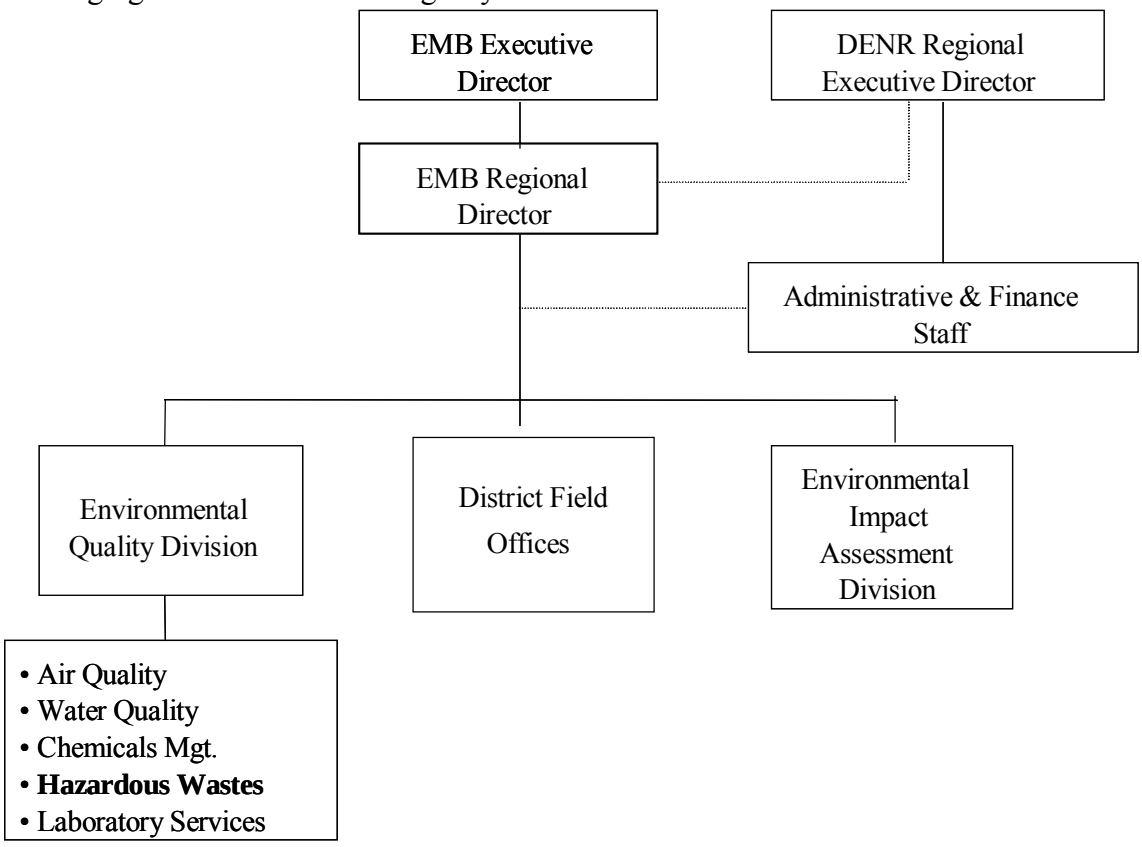


Figure 3.5.3 Organizational Chart of EMB Regional Office

The most common feature is the inclusion of two technical divisions, namely the ad hoc EIA division and the EQD division, and an administrative and finance unit. HWM is handled by the EQD. Usually, HWM tasks are assigned on a part-time basis to one or several staff. Some Regional Offices have formed a separate section to

handle RA6969 matters, that is, toxic chemicals management and hazardous wastes management.

(b) HWM Capability of Regional Offices

Based on a brief survey done by the JICA Study Team, the various Regional Offices demonstrate similar management practices with regards to HWM. The KRA is limited to surveying and monitoring of HW generators as well as responding to public complaints or reports of violation.

Half of the regional offices have no permanent staff assigned exclusively to HWM, but the tasks are shared among one or two persons and in some cases among the whole staff of the EQD. Thus, training on HWM is also open to any staff member. The same is true for the budget and equipment, which are shared with the other units of the Regional Office.

The HWM tasks assigned by the Central Office have been limited to:

- Accepting, reviewing and forwarding generator registrations, applications for transport permit and TSD permit to operate
- Receiving complaints and conducting inspections, as needed, and
- Collecting additional data and doing other filed tasks as required by the Central Office
- Sampling of HW and laboratory analysis when regional laboratory is existing and capable.

However, the role of the regional offices in HWM and implementation of RA6969 and DA92-29 will become much more significant as more and more responsibilities will have to be devolved by the Central Office.

3.6 Overall Assessment Of EMB As The Organization Mandated For HWM

All of the audited items have already been discussed in the foregoing sections. It can be concluded that EMB meets its self-determined targets. However, it is currently not adequately equipped to meet fully its mandates and commitments under RA6969 and DAO 92-29. In fact, EMB has barely implemented the various essential tasks activities identified in its Orientation Manual and Action Plan that were prepared in 1995.

The best option of EMB is to maximize the potential benefits it can gain from being

transformed to a line agency, such as greater mandate with the addition of the Clean Air Act and the Ecological Solid Waste Management Act including:

- Independent Vision-Mission-Goal-Objective and core values setting,
- Expanded national and regional coverage with direct control and supervision over regional and district offices
- Legal basis for requesting increased budgetary appropriations as line agency
- Legal basis for requesting increased staffing complement as line agency

4 PRESENT CONDITIONS AND ISSUES ON PRIVATE SECTOR PARTICIPATION IN HWM

4.1 Characteristics of the HWM Sector

The HWM sector is quite complex, compared to municipal waste management. Its main characteristics are:

a) Production and Service. It involves a wide range of firms in their normal production processes as well as firms which are providing a public environmental service by recycling and disposing of wastes,
b) Linkages. It depends on a chain of actors. These are Generators (the firms which produce wastes as part of their production processes), Recyclers (firms which re-process wastes for re-sale: they obtain their income mainly from sales, with a smaller portion coming from charges to generators for relieving them of their wastes), and Treaters (firms which treat and dispose of wastes which are not recyclable.
c) Leakages. Due to weak monitoring and enforcement and low awareness, both among the firms and the public, many wastes are disposed illegally, especially those originating from SME (small and medium enterprise) generators who can escape detection and both the costs of paying for treatment and the fines for violation.
d) Insecurity. Due partly to weaknesses in regulation and enforcement, and also to the precarious economic position of many generators in the SME sector, the flow of wastes to recyclers and treaters is often sporadic and uncertain.
e) Poor Incentives. Apart from weak enforcement, the HW sector suffers from the lack of incentives to improve the market and the performance of recyclers and treaters.

In summary, the sector's key characteristics that require attention of policy-makers are:

a) A small and insecure current market for recycling and treating HW, but a potentially large one,
b) The need for enforcement and incentives to realize the potential market,
c) Policy measures crafted to focus on reduction as well as treatment of HW, and to address SMEs as well as large scale generators,
d) Measures to improve technologies of recyclers and treaters, and
e) Measures to address the phasing and timing of increasing supply of HW with capacity for recycling, storage and treatment

4.2 Analysis of Stakeholders

In preparing for improvements in policy and business conditions in the sector, a key issue is the recognition of the stakeholder interests and measures to incorporate them into the planning and development process.

The following table identifies the stakeholders, their main objectives, and the tools and actions they use to achieve those objectives:

Table 4.2.1 Objectives, Tools and Actions by Stakeholders in HWM

STAKEHOLDERS	OBJECTIVES	TOOLS/ACTIONS
HW GENERATORS		
Small & Medium Industries	- Generally un-aware of HW problems, dangers, legislation (esp. small industries). - Wish to avoid detection by EMB, BIR	- Sell HW to Traders, Recyclers. - Dump/throw residues
HW TRANSPORTERS		
ENVIRONMENTAL NGOs	- Promote better environmental quality	- Lobby for better HW mgt., but maybe critical of HW disposal facility, especially if community objects.
LOCAL COMMUNITIES	- Protect local environmental quality and property values	- NIMBY syndrome will probably give rise to resistance when specific sites identified.
PUBLIC AGENCIES		
LLDA	- Improve water quality of Laguna Bay. - Reduce pollution in Bay watersheds. - Undertake appropriate development	- Water quality regulations. - Wastewater charges, env. fund. - Enforcement and penalties. - Sponsor dev. projects.
DoH	- Protect public health. - Control hospital wastes.	- Env. health education. - Regulate hospitals and clinics. - Health impact assessment
DPWH	- Develop national infrastructure	- Construct solid waste transfer stations and landfills, access roads, clean waterways.
DoTC	- Control road transport.	- License haulers.
DoST	- Improve industries' technical and management	- Establish industrial standards.

STAKEHOLDERS	OBJECTIVES	TOOLS/ACTIONS
	systems.	- Promote ISO14,000, EMS, CP.
HLURB	- Guide efficient land use. - Promote Housing and building health and safety	- Zoning regs, devt. permits. - Construction permits.
NEDA	- Promote economic development. - Minimize health and env. costs. - Minimize public finance exposure.	- Establish econ. sector priorities. - Project evaluation and approval through ICC process
MoF	- Fiscal discipline. - Revenue generation.	- Fiscal and monetary policy. - Income and capital gains taxes. - Financial controls of LGUs. - Financial guarantees, subsidies.
DTI/BOI/PEZA	- Promote private sector and inward investment.	- Tax incentives. - Advice to industries. - Customs duties.
CCPSP	- Evaluates/guides BOT process	- BOT law, project evaluation. - Contract approval.
LOCAL GOVTS. and MMDA	- Economic and social development. - Environmental quality - Local services	- Municipal waste management business permits. - Property and business taxes. - Enforce env. regulations. - Municipal waste management.
INTERNATIONAL AID AGENCIES AND BANKS	- Economic and social development. - Environmental protection.	- Grants, loans, guarantees. - Technical assistance, training.
HW – NEW TSD FACILITY		
PROJECT SPONSOR	- Achieve efficient TSD dev. & operation.	- Contracts, monitors Proponent. - Assists in coordination w. govt.
PROJECT PROPONENT	- Project Development	- Proposal, raises financing contracting, supervision, closure, decommissioning.
SITE OWNER	- Provision of site	- Purchase/transfer.
PLANT	- Provision of HW plant	- Design, construction,

STAKEHOLDERS	OBJECTIVES	TOOLS/ACTIONS
CONTRACTOR	under Proponent	commissioning, training.
PLANT OPERATOR	- Operation & mgt. under Proponent	- Develop procedures, provide and train staff, operate and monitor facility, decommission.

4.3 Present Policies of GOP

GOP's overall objectives are to reduce, and eventually eliminate HW from the environment.

The policy tools to achieve these objectives include i) regulation, ii) financial and economic incentives, including market-based instruments (MBIs), iii) institutional changes to improve economic efficiency, iv) financial resources, and v) knowledge promotion, including awareness-raising, training, and technical advice

4.4 Current Incentives and Disincentives for HWM

4.1.1 Incentives.

(1) Public Awareness and Pressure

(2) Information and Knowledge

4.4.2 Disincentives

(1) Economic Level and Growth

(2) Lack of MBIs

(3) Lack of Attractive Financing

(4) Regulatory Regime

4.5 Financing of HWM

4.5.1 Financing the Regulation of HW

The regulation of HW is the responsibility of DENR/EMB. As a government department, this has been traditionally financed through the government's budget. The amount which has been available through the budget is grossly insufficient for the

regulation, monitoring and enforcement of HW, and the amounts released by DBM are even less than those budgeted. Given the competition for scarce government funds, this unlikely to improve in the foreseeable future. Moreover, the levels of fines and charges are very low, and rarely imposed; and even if imposed, they cannot be retained, but must revert to the General Fund. It is therefore essential that alternative sources of financing EMB's functions be explored.

4.5.2 Financing the Reduction, Recycling, Treatment, and Disposal of HW

For larger projects such as a TSD for HW, other sources of finance could also be considered. These include multilateral finance through the IFC (World Bank Group), and a similar institution in ADB. These funds are not guaranteed against Forex risk and do not require a government guarantee, and so can lend directly to industries without going through the intermediation of GFIs. As example, the IFC has expressed interest to the Study Team to assist in financing a TSD. IFC could finance both equity and debt.

5. ESTIMATION OF HW GENERATION AND TREATMENT IN THE PHILIPPINES

5.1. Present Situation of HW Generation

5.1.1 Methodology of Estimation of the HW Generation

HW generation amount was estimated based on a summation of the verified registration data.

(1) Procedure of Summation of the Registered HW Generation Amount

Sum of the registered HW generation amount was estimated through the following steps.

Deletion of Duplicated ID

Reconsideration of the Industrial Category

Reconsideration of HW Code

Conversion of the Generation Amount (Standardized to the Tonnage Base)

Deletion of the Registered Generators without PSIC and Number of Employees

After the above steps, the HW generation amount by region and the type of HW were estimated.

5.1.2 Results of Summation of the Registration Data

(1) Generators Registered

The number of registered generators is 1,079 and of these, 719 registration data have both PSIC and number of employees.

Table 5.1.1 Generators, Employees by Industrial Category

Industrial Code	No. of Generators		No. of Employees		Employees / Generator
1 Agricultural Industries	6	0.8%	232	0.1%	39
2 Mining	12	1.7%	6,671	2.4%	556
3 Manufacturing	464	64.5%	226,670	80.7%	489
4 Electricity, Gas &	124	17.2%	18,778	6.7%	151

Industrial Code	No. of Generators		No. of Employees		Employees / Generator
Water					
5 Construction	3	0.4%	193	0.1%	64
6 Wholesale Trade	42	5.8%	2,459	0.8%	59
7 Transportation Services	3	0.4%	969	0.3%	323
8 Financial Services	2	0.3%	2,015	0.7%	1,008
9 Public Administration & Defense	63	8.8%	22,906	8.2%	364
Total	**719**	**100.0%**	**280,893**	**100.0%**	**391**

(2) HW generation amount registered

The adjusted sum of the HW generation amount registered is 278,393 tons/year. Table 5.1.2 shows generation amount by the type of HW.

Table 5.1.2 HW Generation Amount by Type of HW

HW Code	Generation Amount (ton/year)	Rate (%)
A Plating wastes	11,233	4.0
B Acid wastes	26,900	9.7
C Alkali wastes	56,099	20.2
D Inorganic chemical wastes	68,103	24.5
E Reactive organic wastes	14,769	5.3
F Organic solvents	2,216	0.8
G Putrescible /organic wastes	30,588	11.0
H Textile	81	0.0
I Oil	22,549	8.1
J Containers	3,499	1.3
K Immobilized wastes	516	0.2
L Organic chemicals	16,226	5.8
M Miscellaneous wastes	25,614	9.2
Total	278,393	100

The generation amount of “D: Inorganic chemical wastes” of 68 thousand tons/year is the largest. Lead compound has the largest volume and estimated to be about 29 thousand tons and the second largest volume is the salts and complexes estimated to be about 27 thousand tons/year. Please refer to Table 11-4 Annex 11.

The second largest one is “C: Alkali wastes” of 56 thousand tons/year. Most of the

alkali wastes are sludge containing metals generated through neutralization by using calcium oxide. There is some possibility that the amount of this sludge being stored is declared as the generation amount of alkali wastes.

The third largest is "G: Putrescible / Organic Wastes" of 31 thousand tons/year. G801: Animal/abattoir wastes considered as washing water at the meat processors is 7.5 thousand tons/year. 23 thousand tons/year of "G899: Other putrescible waste" is also a big amount, but it seems to be an organic sludge classifies as non-hazardous wastes.

The fourth is "B: Acid wastes" of 29 thousand tons/year. 88% of this waste is being treated within the facilities and it seems the waste is discharged as salts after neutralization.

The fifth is 25 thousand tons/year of "Miscellaneous waste" in which "M503: Pharmaceutical waste and drugs" is 11 thousand tons/year and "M650: all emission control dust/sludge" is 10 thousand tons/year.

(3) The Present Situation of HW Treatment

The registration data without description of the treatment method were counted as an unclassified treatment. Also waste water treatment and incineration are regarded as on-site treatment.

The table5.1.3 shows a procedure for the estimation of treatment demand and the table 5.1.4 shows HW amount estimated.

Table 5.1.3 Estimation Procedure of HW Treatment Demand

Category	Descriptions
Generation amount (A)	Sum of HW generation amount registered
Recycle amount (B)	Recycled and/or reused HW waste on/off site of the facilities
Treatment demand (C)	(A)-(B): HW needed treatment for disposal
On-site treatment amount (D)	HW amount registered as treated by incineration, lagoon, biological one, chemical one and oil separation is considered as the on-site treatment amount.
Off-site treatment	(A) – (B) – (D) : On-site Storage, Disposal, HW carried out, HE Exported and HW unclassified are included

Table 5.1.4 HW Amount to be Treated

(tons/year)

HW Code	HZ Generation amount (A)	Recycle Amount (B)	Treatment Needed (C)	On-Site Treatment (D)	Off-Site Treatment (E)
A Plating wastes	11,233	0	11,233	9,572	1,661
B Acid wastes	26,900	1,087	25,813	24,667	1,146
C Alkali wastes	56,099	1,523	54,576	11,107	43,470
D Inorganic chemical wastes	68,103	33,392	34,711	2,015	32,696
E Reactive organic wastes	14,769	297	14,473	1,871	12,602
F Organic solvents	2,216	850	1,366	161	1,204
G Putrescible /organic wastes	30,588	8,217	22,371	9,942	12,429
H Textile	81	0	81	9	71
I Oil	22,549	12,540	10,009	1,377	8,632
J Containers	3,499	1,249	2,250	154	2,097
K Immobilized wastes	516	61	455	64	391
L Organic chemicals	16,226	8,649	7,577	6,151	1,426
M Miscellaneous wastes	25,614	1,690	23,923	1,412	22,511
Total	278,393	69,555	208,837	68,501	140,336

a) Recycle Amount (B)

Recycled HW amount registered is estimated as 69.6 thousand tons/year. 33.3 tons/year of "Inorganic waste" is biggest and 12.5 thousand tons/year of solvent and waste oil, 8.6 of organic chemicals, 8.2 of putrescible/organic waste follow.

b) Treatment Needed (C)

Demand of HW treatment is 209 thousand tons/year which is the difference between generation amount and recycled one. Largest amount of the HW to be treated is Alkali waste, 54.6 thousand tons/year, and the second is 34.7 tons/year of inorganic chemical wastes.

c) On-Site Treatment Amount

Sum of on-site treatment is estimated as 68.5 thousand tons/year. Breakdown of the on-site treatment is 3.5 thousand tons/year by incineration, 24.9 thousand ton by lagoon.

As far as the type of HW, the amount of acid waste and alkali waste has accounted for the half of all.

d) Demand of Off-Site Treatment Amount

Sum of the amount of off-site treatment is 140 thousand tons/year. The biggest amount is 43.5 tons/year of Alkali wastes and the next is 32.7 thousand of inorganic waste (23.3%), the third is 22.5 thousand ton of miscellaneous wastes (16.0%).

(4) HW by Region

HW amount registered from NCR accounts for almost half of the whole country. And the HW amount from CALABARZON consists of NCR, and Region 4 takes 70%. Waste amount from the remaining region is less than 20,000 tons/year.

Table 5.1.5 HW Generation Amount by Region

Region	Generation Amount (tons/year)	Rate
01: Ilocos	3,937	1.4%
02: Cagayan Valley	1	0.0%
03: Central Luzon	18,939	6.8%
04: Southern Tagalog	56,613	20.3%
05: Bicol	97	0.0%
06: Western Visayas	7,210	2.6%
07: Central Visayas	8,912	3.2%
08: Eastern Visayas	11,323	4.1%
09: Western Mindanao	60	0.0%
10: Northern Mindanao	14,178	5.1%
11: Southern Mindanao	7,771	2.8%
12: Central Mindanao	17,383	6.2%
13: CARAGA	42	0.0%
14: ARMM	10	0.0%
15: CAR	622	0.2%
16: NCR	131,295	47.2%
Total	278,393	100.0%

5.2 Methodology of Extended Estimation

5.2.1 Extended Estimation of HW Generation Amount

The amount of industrial HW is generally estimated by the multiplication of the generation unit per index of activities and number of index. Production amount is not included in the registration data although it is the most suitable index to estimate the industrial waste generation. Therefore the number of employees, which does not show the industrial activities, can be used as an index and there is no other choice to use this index for the extended estimation.

Accordingly, the extended estimation is given by the following formula.

$$\text{HW Generation amount} = \sum_{i=1}^{n} (Mi \cdot Gij)$$

i = Industrial category
j = Type of waste
M ＝ Number of employees (person)
G ＝ HW generation unit (tons/year/person)

However, this method has the following disadvantages.

Generation unit is estimated based on the data given only by HW generators.

Number of employees as an index has included not only the HW generators but facilities not generating HW.

Therefore the above formula inevitably overestimates the generation amount since the registration data indicates that all facilities categorized in industry generates HW. The results become obviously larger than the actual amount since generation units does not consider the facilities that do not generate HW.

Table 5.2.1 compares the registration data and the extracted data by the scale of employees.

Table 5.2.1 Comparison between Registration Data and NSO Data

Scale of Industries (No. of Employees)	< 10	10 - 49	50 - 199	200 - 999	1000 <	Total
No. of Generators registered	76	169	209	197	68	719
No. of Industries screened from NOS data	131,505	15,837	3,440	1,262	158	152,202
Coverage ratio	0.1%	1.1%	6.1%	15.6%	43.0%	0.5%
Targeted coverage ratio considering priority	1.0%	10.0%	60.0%	100.0%	100.0%	-
Number of Potential Generators	1,315	1,584	2,064	1,262	158	6,383

However the extracted facilities from NSO data include that of non-HW generators. If the HW generation amount is estimated based on 152,202 facilities, it will be obviously higher than actual one. JICA study team set the target rate of the registration coverage considering priority of the scale of facilities to be paid attention as HW generators. Therefore, 4,845 facilities were estimated as potential generators according to the targeted coverage rate shown in the lowest two columns in the table.

The extended estimation proceeded based on this number of potential generators. HW generation amount of the extended estimation by treatment methods is calculated in portion to the ratio obtained through analysis of the registration data.

5.2.2 Results of Extended Estimation

Total HW generation amount of extended estimation is 2.41 million tons per year. HW generation amount by regions and also by industrial category are shown below.

Table 5.2.2

Extended Estimated HW amount by Category of Industry and type of HW

HW Code	Present HW Generation amount	Extended Estimated Generation Amount	Current / future amount ratio	Ratio by HW type
A Plating wastes	11,233	174,945	15.6	7.26%
B Acid wastes	26,900	177,127	6.6	7.35%
C Alkali wastes	56,099	545,631	9.7	22.64%
D Inorganic chemical wastes	68,103	335,014	4.9	13.90%
E Reactive organic wastes	14,769	169,721	11.5	7.04%
F Organic solvents	2,216	49,265	22.2	2.04%
G Putrescible /organic wastes	30,588	140,489	4.6	5.83%
H Textile	81	851	10.5	0.04%
I Oil	22,549	491,623	21.8	20.40%
J Containers	3,499	37,036	10.6	1.54%
K Immobilized wastes	516	53,869	104.4	2.23%
L Organic chemicals	16,226	155,201	9.6	6.44%
M Miscellaneous wastes	25,614	79,509	3.1	3.30%
Total	278,393	2,410,281	8.7	100.00%

6. PRESENT ISSUES IN HWM IN THE PHILIPPINES

This chapter identifies the current issues in HWM in the Philippines based on the current situation analyzed in Volume 1 so as to incorporate them into the master plan.

6.1 Assessment of Present HWM in the Philippines

This Section assesses the present HWM in the Philippines whether hazardous wastes are managed properly in compliance with the relevant laws in the following categories:

- Whether HWM at sources
- HWM by haulers (transporters)
- HWM by TSD operators
- Overall mechanism of HWM

The main issues of present HWM in the Philippines are outlined as follows:

- There are only 1,079 HW generators officially registered at EMB as of the year 2000, which is much smaller than the potential number of HW generators.
- The amount of HWs generated by the registered generators is approximately 280 thousand tons per year, of which around 100 thousand tons per year are forced to be stored at sources due to limited availability of proper TSD facilities.
- The regulating authority cannot properly identify and control the flow of HWs due to insufficient enforcement of present laws and regulations. It is also difficult for the authority to identify the conditions of compliance with the laws and regulations by HW generators and TSD operators.
- There are no serious environmental impacts of HWs revealed in the Philippines; they may exist but cannot be identified by the government due to its limited capacity of monitoring and inspection.

6.2 Key Factors Contributing to Insufficient HWM

Key factors contributing to insufficient HWM in the Philippines include:

- Lack of awareness and management system of HWM at sources (generators),
- Limited technical and financial capacity of private TSD operators, and
- Lack of and insufficient enforcement of laws and regulation on HWM.

6.3 Issues to Be Addressed in the Master Plan

Considering the issues identified above, the master plan will focus on the followings for realization of proper HWM in the Philippines:

- Promotion of 3R (reduction, reuse, and recycling) of HWs by generators, and establishment of proper HWM at sources based on PPP,
- Promoting the development of TSD facilities for proper treatment and disposal of HWs, and
- Strengthening laws, regulations, and enforcement capacity of the regulating authority on HWM.

7. BASIC POLICY FRAMEWORK OF HW RECYCLING AND TREATMENT

This chapter clarifies the basic principle and policies, goals and targets of HWM in the Philippines by the year 2010. It also discusses the basic policy framework of HW recycling and treatment to be built by EMB/DENR for proper HWM.

7.1 Basic Principle of HWM

There is no clearly identifiable case of serious health or environmental damages from improper HWM in the Philippines. However, HW is suspected to be discharged through various medias into the environment. Although no such incident has yet been reported officially due to limited capacity of relevant scientific investigation, it is speculated that hazardous substances may have already been eluted into watercourse or groundwater and exposed to humans and other living organisms.

Since the Philippines is in the initial stage of full-scale industrialization, environmental pollution induced by subsequent HW generation does not yet outbreak in a large scale. Nevertheless, considering recent rapid growth of hi-tech industry that generates quantity of HW, it is urgent to implement proper HW management at the earliest possible. Future generations should be left out from the possibility of environmental pollution by present HW generation.

It is a timely situation now in the process of large-scale industrialization in the Philippines to take preventive measures against HW induced pollutions.

7.1.1 Basic Policies on HWM

'Preventing possible damages on human health and environment, contributing to the development of sustainable society, and no environmental liabilities for the future generation', are the universally known and agreed policy objectives on HWM. The basic policies to achieve these objectives are given by '3Rs and 1P' policies, namely:

- Reduce (Waste minimization and detoxification at sources)
- Reuse
- Recycle
- Proper treatment (Intermediate treatment to reduce environment load at final disposal)

Reduce (Waste Minimization) means to minimize HW generation at sources by lowering the use of hazardous substances and unnecessary raw materials in the production process through proper process management. **Reuse** includes the efforts of returning the generated waste to the same or other production processes as raw materials. After the above efforts by generators, the remaining wastes should be processed for usable raw materials (material recycling) or as energy sources (thermal recycling), that is defined here as **'Recycling'**. **Proper treatment** is the last option for HWM that deal with the remaining HW from the above 3 efforts (Reduce, Reuse and Recycling). In this last stage, remaining HW is detoxified at its maximum before going to final disposal sites (landfills).

7.1.2 Priority on Reuse and Recycling

Reuse and recycling of HW should be given higher priority than treatment and disposal practices even after TSD facilities are sufficiently provided in the Philippines. Reuse of HW inside the premises of generators is first pursued. Next, reuse and recycling in other premises should be examined.

These reuse and recycling of HW should be promoted under the market mechanism. Some of HWs contaminated with impurities need to be reprocessed to remove such impurities so that they can be sold in the market. In such cases, HW generators pay the reprocessing cost to recyclers, and the recyclers have to properly reprocess the HW before its transaction in the market.

7.1.3 Proper Treatment and Disposal for Protecting Human Health and the Environment

It is one of the primary concern in HWM that how the HW should be finally returned to the environment.

HW is to be detoxified at its maximum before finally disposing of at landfills in order that no environmental risk or liabilities may be left remained to the future

generation.

There are mainly two different types of policies on final disposal of HW. One is to completely detoxify and stabilize HW before its final disposal. This policy is based on the view of minimizing the present and future environmental risks as for the difficulty in supervising and monitoring the landfills forever after their closure. This view also considers maximizing the use of the closed landfill in the future. The EU nations, such as Germany and Netherlands, have adopted this policy. The EU Landfill Directive issued in 1999 also supports this. Furthermore, Japan is too following this trend. In general, the countries with difficulty obtaining land for landfill sites are espousing to this policy.

Meanwhile, there is another policy of HW landfill in which HW is allowed to be brought into landfill with its hazardousness remained. Final disposal facilities (landfills) for this policy are strictly designed to block the possible leakage of hazardous substances to the environment. This second policy is applied in the U.S.A, where acquiring landfill sites are relatively easy.

The cost of HW treatment is higher in the former policy than the latter one's. On the other hand, potential environmental risks remains permanently at the landfills in the latter policy while they are minimized in the former policy.

In case of the Philippines, issues on the waste landfill draw a great deal of public attention now, making very difficult to acquire the land for establishing waste landfills. Furthermore, it is one of the most important policy objectives in HWM in the Philippines to eliminate or minimize the environmental risks now and not to carry them over to the future generations.

It will require higher cost to detoxify and stabilize HW before its final disposal than treating it at landfill. There may be an argument to choose the second policy for sheltering economic activity; however, the Philippines should take the first policy considering the potential threat of HW to human health and environment.

7.2 Establishment of Targets for Hazardous Waste Management

In the basic principle of HWM, priority is placed to firstly reduce (waste minimization), secondly reuse, and lastly recycle the HW. However, even after maximizing these efforts, there still remains HWs to be properly treated and disposed. The Philippines is still not well prepared to properly deal with these remaining HWs.

Therefore, in terms of protecting human health and environment, development of the proper HW treatment and disposal system should be given the first policy priority of the Philippines Government in HWM sector.

Based on the above recognition, the master plan defines the development of proper HW treatment and disposal system as the top policy priority in HWM sector in the Philippines.

7.2.1 Goals and Targets

7.2.1.1 Goals

The ultimate goal of HWM is to eliminate the threat of HW to human health and environment by the complete control of HW flow. Figure 7.2.1 shows the conceptual image of the ideal HWM to be achieved.

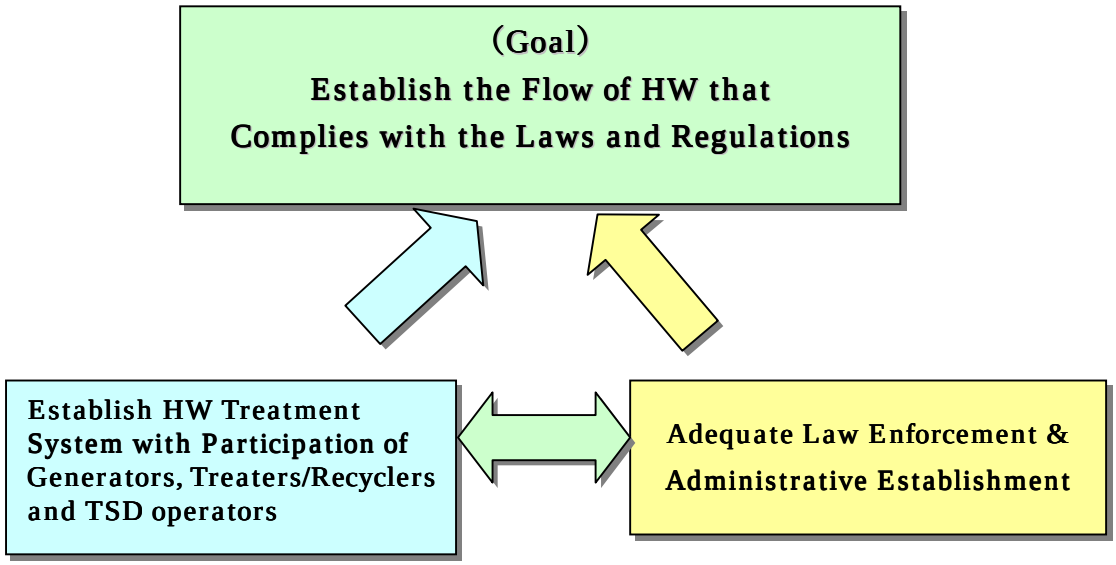


Figure 7.2.1 Conceptual Image of the Ideal HWM

There are two main issues to be addressed to achieve the complete control of HW flow. One is to establish proper HWM mechanism by HW generators and TSD operators (also including recyclers and haulers), and the other is to establish full-scale HWM administration and law enforcement mechanism. These two issues are closely connected with each other. Strict law enforcement on HWM will not be possible without any sufficient HW treatment facilities. Likewise, without any law

enforcement on HWM, proper TSD facilities will never be developed. Therefore, both issues have to be simultaneously addressed to reach the ultimate goal of HWM.

7.2.1.2 Targets

The Study Team establishes the following three policy targets to achieve the above goal by the year 2010.

- Development of TSD facilities needed for proper treatment and disposal of HW,
- Establishment of proper management of HW at sources and promotion of 3R, and
- Complete law enforcement and full-fledged establishment of HWM administration by the Government

(1) Development of TSD facilities needed for proper treatment and disposal of HW

1. All the HWs from the registered generators will be properly managed by the TSD facilities to be developed by 2010.

Some of the HWs need special treatment or disposal for their detoxification and safe management, which goes beyond the capacity of individual HW generators. HW treatment and disposal facilities have to be built to receive and collectively deal with these HWs. Since this type of facility requires a large investment, governmental support will be needed to promote its development.

(2) Establishment of proper management of HW at sources and promotion of 3R

1. Complete registration of 6,500 HW generators, and compliance with the reporting duties.
2. Proper HWM at sources and promotion of 3R (Reduce, Reuse, and Recycle)
3. Establishment of the in-house HWM system at sources

The primary targets of HWM are the official registration of HW generators and efforts of 3R with the conventional technologies by individual generators.

(3) Complete law enforcement and full-fledged establishment of HWM administration by the Government

1. Establishment of legal, regulatory, and administration system to control HWM by generators, haulers, recyclers, and treaters (TSD operators)

To realize complete enforcement of DAO92-29 and RA6969, the Philippines government has to formulate and enact supporting laws, regulations, and standards at

the earliest possible. The governmental HWM administration has also to be further enhanced through human resource development, capacity building, and necessary organizational reforms.

7.2.2 Phased Targets and Their Compliance Scenarios

The Study Team established the phased targets of HWM by the year 2010. The coming 10 years up until 2010 are divided into three phases as follows:

1st Phase: 2001 to 2004
2nd Phase: 2005 to 2007
3rd Phase: 2008 to 2010

(1) Development of TSD Facilities for HW

To properly treat and dispose of the HWs that are difficult to be handled by individual HW generators and existing TSDs, the master plan set up the phased targets of TSD facilities development as given in Table 7.2.1 below.

Table 7.2.1 Phased Targets of TSD facilities Development and Operation

Items	1st Period 2001-2004	2nd Period 2005-2007	3rd Period 2008-2010
Development of a Model Integrated HW Treatment Facility (MIF)	・Preparation and construction of the facility.	・Begin operation in 2005	・Continued operation
Facility Development by Private Sector	・Prepare a national plan for promoting TSD facility development with private sector participation.	・Implementation of the promotion plan through control of TSD facility development by the Government. ・Development and/or operation of the private TSD facility by 2007	・Facility expansion
Development of HW Recycling Facilities by Private Recyclers	・Designation of priority HWs for recycling ・Formulation of the national recycling promotion plan	・Promoting development of HW recycling facilities in response to the growth of recycling market	・Promoting development of HW recycling facilities in response to the growth of recycling market

(2) Establishment of HWM at Sources (Generators) and Promotion of 3R

The master plan set the phased targets for the following policy issues:

- **Compliance with the Registration and Regular Reporting Duties by HW Generators**
- **Promotion of Waste Minimization, Recycling, and Proper Treatment**
- **Establishment of Proper HWM System at Sources (Generators)**

Table 7.2.2 showed the phased targets of the above policy issues.

Table 7.2.2
Phased Targets on Establishment of HWM at Sources and Promotion of 3R

Items	1st Period 2001-2004	2nd Period 2005-2007	3rd Period 2008-2010
Compliance with the registration and regular reporting duties	No. of registered generators 3,200	No. of registered generators 5,000	No. of registered generators 6,500
	・Complete compliance with reporting duties by generators.	・Complete compliance with reporting duties by generators.	・Complete compliance with reporting duties by generators.
Promotion of Waste Minimization, Recycling, and Proper Treatment	・Determine the priority HWs and its generators, and promote waste minimization and recycling.	・Further expand recycling through disseminating the achievement	・ Further expansion of the efforts.
	・Full-scale implementation of proper HWM at sources.	・Full-scale implementation of proper HWM at sources.	・Full-scale implementation of proper HWM at sources.
Establishment of Proper HWM System at Sources (Generators)	・Promote establishment of HWM system (guidelines, manuals)	・ Start establishment	・Further expansion

(3) Complete law enforcement and full-fledged establishment of HWM administration by the Government

Proper HWM by the regulating authority consists of:

- **Enactment of relevant laws and regulations,**
- **Establishment of strengthened HWM administration, and**
- **Strict law enforcement and implementation of relevant policies and measures.**

The master plan will deal with these policy issues in accordance with the phased targets as mentioned in Table 7.2.3.

Table 7.2.3 Phased Targets of Law Enforcement and Full-Fledged Establishment of HWM Administration

Category	1st Period 2001-2004	2nd Period 2005-2007	3rd Period 2008-2010
Laws and Regulations	・Prepare and enact necessary laws and regulation by 2003	・Continuous efforts	・Continuous efforts
Establishment of Strengthened HWM Administration	・Capacity increase of current staffs.	・Establish full-fledged administration system.	・Continuous efforts
Law Enforcement and Related Policy Measures			
・Monitoring & Inspection	・ Formulation of the implementation plan and starting implementation. ・ Establishment of waste tracking system.	・Continuous efforts.	・Continuous efforts.
・Economic Instruments	・Examine the feasibility and implementability of various instruments.	・Introduction of economic instruments.	・Continuous efforts.
・Awareness Raising	・Program development and implementation.	・Continuous efforts.	・Continuous efforts.

7.3 Overall HWM Policy Mechanism

The overall HWM policy mechanism recommended in this chapter is outlined in Figure 7.3.1.

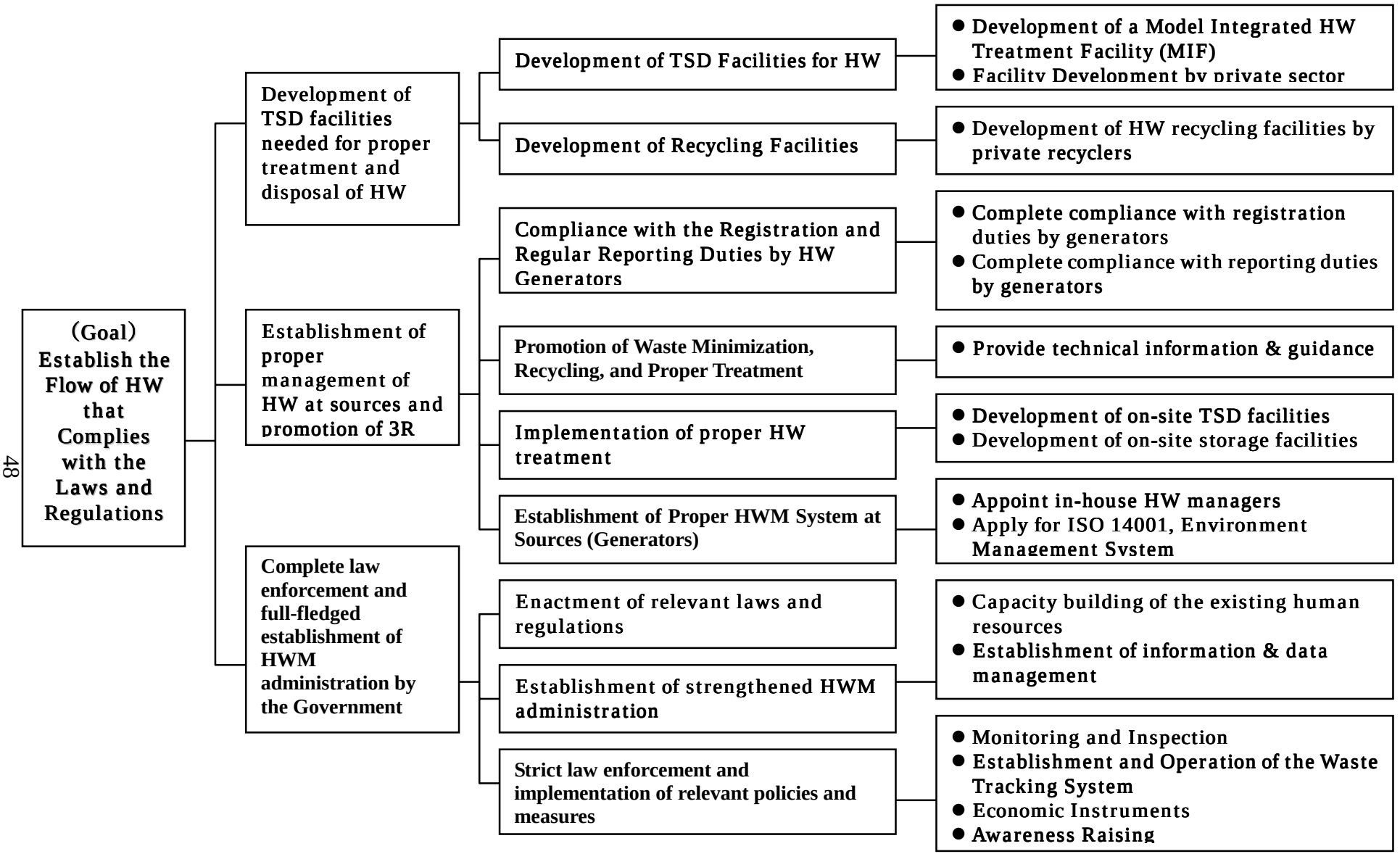


Figure 7.3.1 Recommended Overall HWM Policy Mechanism in the Philippines

8. BASIC HAZARDOUS WASTE TREATMENT STRATEGY AND PLAN

This chapter first discusses the basic framework of HW treatment and disposal and detail criteria for treatment and disposal of HW. Subsequently, it formulates the strategy and plan of the TSD facility development with the roles of key stakeholders in HWM.

8.1 Basic Framework of HW Treatment and Disposal

The basic principle of HWM, as given in Chapter 7, consists of 3 R (Reduce, Reuse, Recycle) and proper treatment and disposal of HW. This chapter discusses the proper treatment and disposal of HW.

Proper treatment and disposal are defined as those in compliance with the relevant laws and regulations. In the case of the Philippines, however, there is no available criterion for determining the adequate levels of HW treatment and disposal. Therefore, establishment of such criteria is the first policy issues to be addressed in formulating the master plan on HWM.

It is the waste acceptance criteria for landfill that has to be first determined in formulating the total legal and regulatory system of HWM. Since all the HWs finally go to landfills, how much the environmental load of HWs has to be minimized before landfills determines the levels of HW treatment as well as the landfill measure itself.

The landfill criteria consist of:

- Designation of the HWs not treated in landfills,
- Waste acceptance criteria for landfills,
- Establishment of the landfill facility standards.

Figure 8.1.1 shows the basic framework of selecting HW treatment technology. At first, recyclability of HW is judged in view of its value. Subsequently, acceptability of the HW at landfill is examined according to the waste acceptance criteria. If the HW does not comply with the criteria, it has to be treated to minimize its toxicity. Depending on the toxicity characteristics of HW, proper treatment measures such as physicochemical treatment, thermal destruction, solidification, etc. are selected.

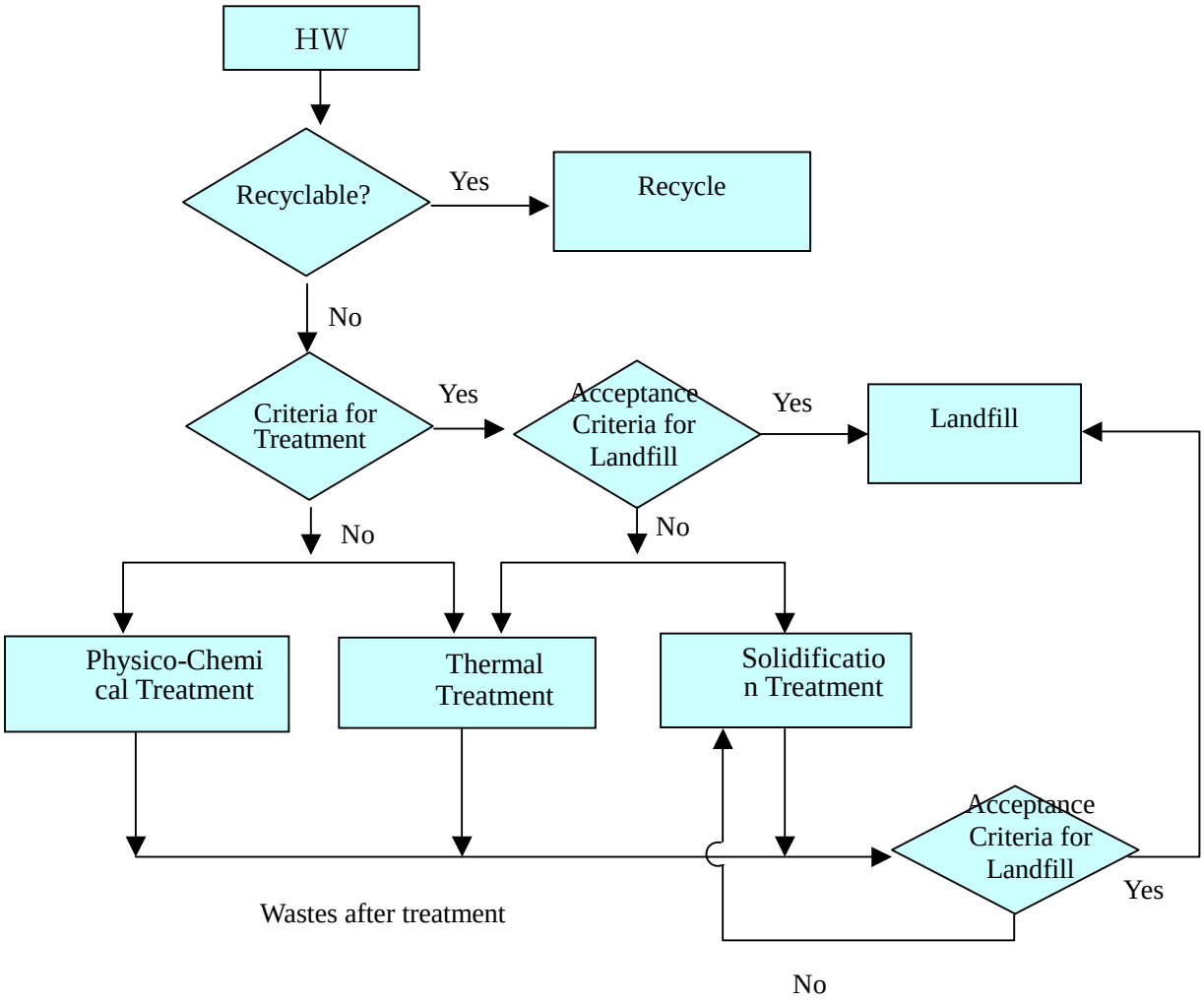


Figure 8.1.1 Flow Chart of Selecting Proper HW Treatment Measures

In order to ensure proper treatment of HW in accordance with the flow above, HW treatment standard and its acceptance criteria for landfill have to be provided in the form of legally binding decisions by the national authority. They will also contribute to strengthened enforcement of DAO92-29.

8.2 HW Treatment Standard

8.2.1 Criteria for HW Treatment and Landfill

Table 8.2.1 shows the recommended treatment measures to be applied by types of HWs before their final disposal at landfills.

As the first step of proper HWM in the Philippines, the regulating authority has to determine what HWs are prohibited to be treated at landfills. The HWs of liquid, ignitable, explosive, and reactive states needed to be prohibited for direct disposal at landfills.

Table 8.2.1

Recommended Treatment Measures by HW Categories

HW No.	Class/Sub-category	Criteria for Treatment	Remarks
A101~ 105, A199	Plating wastes Plating waste with cyanide (solution and salts)	- Landfill of waste in liquid state is prohibited. - Landfill after detoxification by physicochemical treatment.	- Highly concentrated liquid cyanide must be decomposed by thermal treatment.
Acid wastes			
B201	Sulfuric acid	- Landfill of waste in liquid state is prohibited. - Liquid wastes must be chemically treated. - Residues generated from the above process may go to landfill in accordance with the acceptance criteria.	
B202	Hydrochloric acid		
B203	Nitric acid		
B204	Phosphoric acid	- To be neutralized and separated by sedimentation. - Residues must be solidified.	
B205	Hydrofluoric acid		
B206	Mixture of sulfuric and hydrochloric acid	- Liquid waste must be chemically treated. - Residues generated from the above process may go to landfill in accordance with the acceptance criteria.	
B207	Other inorganic acid		
B208	Organic acid	- To be neutralized and thermally decomposed.	
Alkali wastes			
C301	Caustic soda	- Landfill of the waste in liquid state is prohibited. - To be neutralized and treated at landfill in the form of neutral salt or metal hydroxide	
C302	Potash		
C303	Alkaline cleaners		
C304	Ammonium hydroxide		
C305	Lime slurries		
C306	Lime-neutralized metal sludge	- To be solidified if the waste does not comply with the waste acceptance criteria for landfill.	

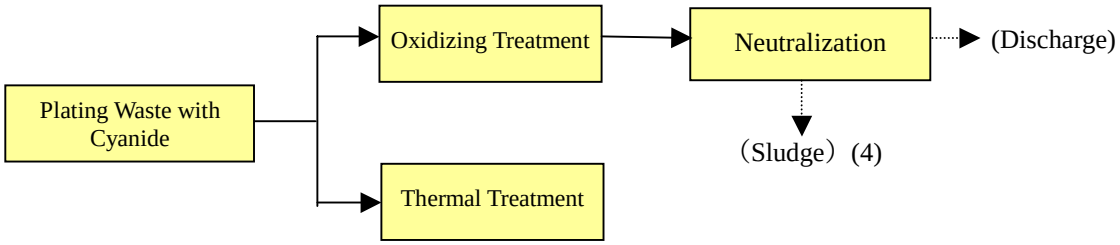
HW No.	Class/Sub-category	Criteria for Treatment	Remarks
C399	Other alkaline materials	- Landfill of the waste in liquid state is prohibited. - To be neutralized and treated at landfill in the form of neutral salt or metal hydroxide	
Inorganic chemical wastes			
D401	Non-toxic salts	- Landfill of the waste in liquid state is prohibited. - To be solidified to comply with the acceptance criteria for landfill.	
D402	Arsenic and its compound		
D403	Boron compounds		
D404	Cadmium and its compounds		
D405	Chromium compounds		
D406	Lead compounds		
D407	Mercury and mercuric compounds	- Same as above.	
D499	Other salts and complexes		
Reactive chemical wastes			
E501	Oxidizing agents	- Landfill is prohibited. - To be chemically treated by types of materials	
E502	Reducing agents	- Landfill is prohibited. - To be chemically treated by types of materials	
E503	Explosive and unstable chemicals	- Landfill is prohibited. - To be treated at sources.	
E599	Highly reactive chemicals	- Landfill is prohibited. - Chemical treatment for each type.	
Paint/Resins/Lattices/Inks/Dyes/Adhesives/Organic Sludge			
E601	Aqueous-based	- Landfill of the waste in liquid state is prohibited. - The waste in solid state can be treated at landfill if it meets the acceptance criteria. - Solidification or thermal treatment may be needed for non-compliance wastes	
E602	Solvent-based		
E699	Other mixed		
Organic solvent			
F701	Flash points＞ 61℃	- Landfill of the wasre in liquid state is prohibited. - To be thermally treated.	
F702	Flash points＜ 61℃		
F703	Chlorinated solvents and residues	- Landfill of the waste in liquid sate is prohibited. - Thermal or physicochemical treatment is needed.	Organic chlorine materials may be chemically treated.
Putrescible/Organic Wastes			
G801	Animal/abattoir waste	- Landfill is prohibited. - Thermal treatment or biological treatment, including composting is required.	Some of the waste can be biologically treated to composts or animal food.
G802	Grease trap wastes from industrial or commercial premises		
G899	Others		
Textile			
H901	Tannery wastes	- Thermal treatment is required to comply with the acceptance criteria.	

HW No.	Class/Sub-category	Criteria for Treatment	Remarks
H999	Other textile wastes	- Thermal treatment is required to comply with the acceptance criteria.	
Oil			
I101	Waste oils	- Landfill is prohibited. - Thermal treatment is required to comply with the acceptance criteria unless the waste is recycled.	
I102	Interceptor sludge		
I103	Vegetable oils		
I104	Waste tallow		
I105	Oil/water mixtures		
Containers			
J201	Portable containers previously containing toxic chemical substances	- Landfill is prohibited. - To be recycled after rinsing or thermally treated before landfill.	
Immobilized Waste			
K301	Solidified and polymerized wastes	- To be properly treated before landfill by types of materials.	
K302	Chemically fixed waste	- Landfill is allowed.	
K303	Encapsulated wastes		
Organic Chemicals			
L401	Aliphatics	- Landfill is prohibited. - To be thermally treated.	
L402	Aromatics and phenolics		
L403	Highly odorous		
L404	Surfactants and detergents		
L405	Halogenated solvents	- Landfill of the waste in liquid state is prohibited. - Thermal or physicochemical treatment is required.	Same as F703
L406	Polychlorinated biphenyls and related materials	- Landfill of the waste in liquid state is prohibited. - Thermal or physicochemical treatment is required. - Solid waste can be treated in landfill if it meets the acceptance criteria.	
L499	Other organic chemicals	- Landfill of the waste in liquid state is prohibited. - To be thermally treated.	
Miscellaneous Wastes			
M501	Pathogenic or infectious wastes	- Landfill without treatment is prohibited. - Sterilization is required.	
M502	Asbestos wastes	- Solidification and proper packaging are required before landfill.	
M503	Pharmaceutical wastes and drugs	- Landfill is prohibited. - To be decomposed by thermal treatment	
M504	Pesticides	- Landfill is prohibited. - To be decomposes by thermal treatment.	

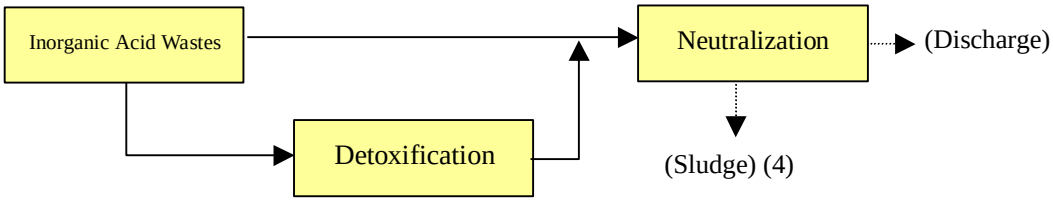
8.2.2 Establishment of HW Treatment Flow

Required standard flow of HW treatment is summarized below by types of HW.

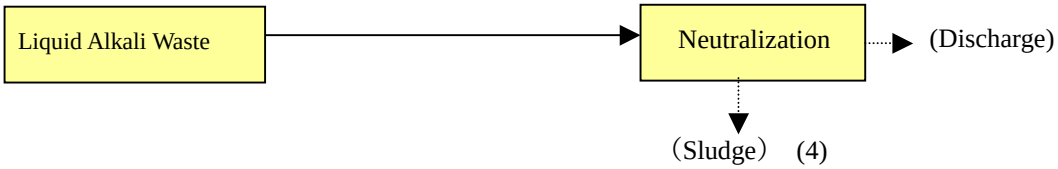
1) Cyanide Plating Waste and the Likes



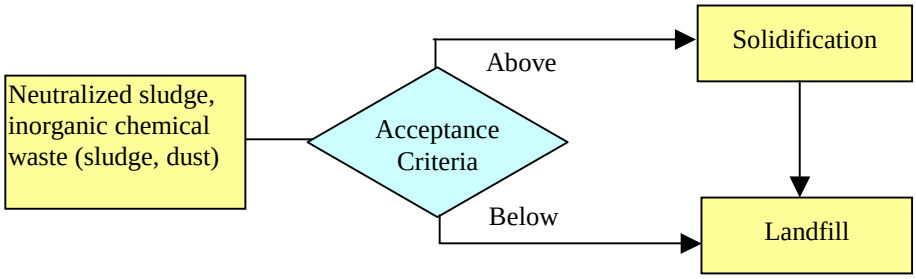
2) Inorganic Acid Wastes



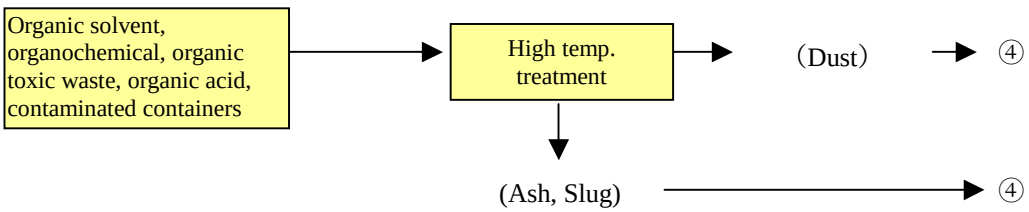
3) Alkaline Liquid Wastes



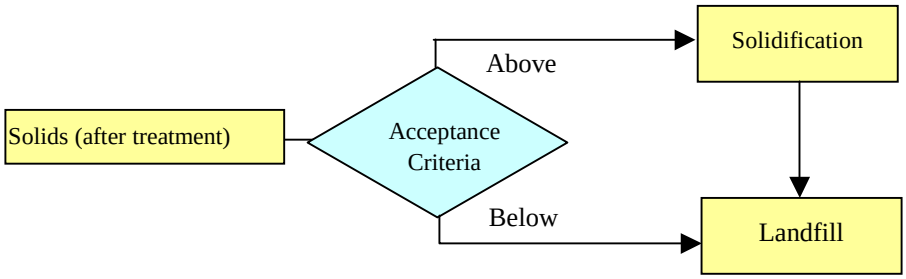
4) Sludge after Neutralization and Inorganic Chemical Wastes (Dust, Ashes, etc.)



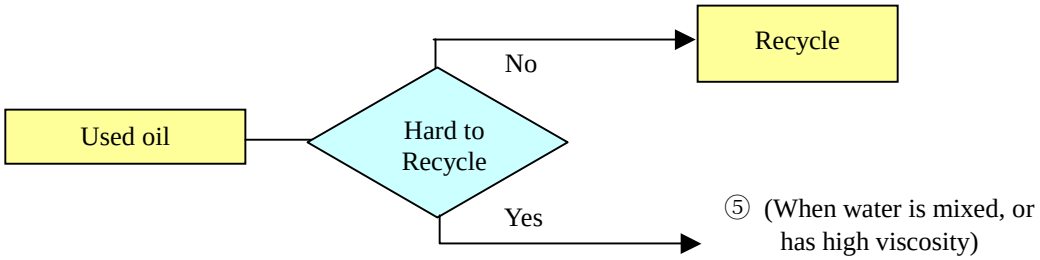
5) Organic Solvents, Chemicals, Acids and Other Hazardous Organic Substances



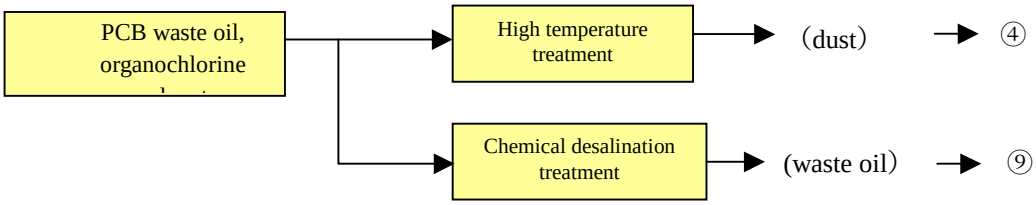
6) Solids (Treatment Residues)



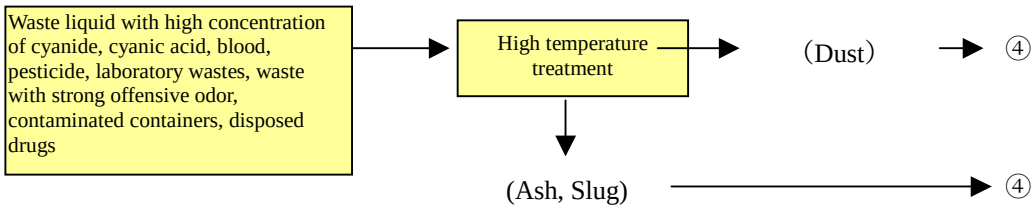
7) Waste Oil



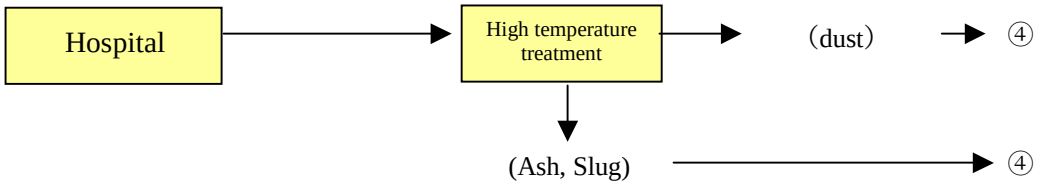
8) Toxic Materials (PCBs, Organic Chlorinated Solvents)P



9) Specially Controlled Wastes (Highly Concentrated Cyanide Liquids, Cyanides, Blood, Insecticides, Laboratory Wastes, Highly Offensive Odorants, HW-Contaminated Containers, waste medicines)



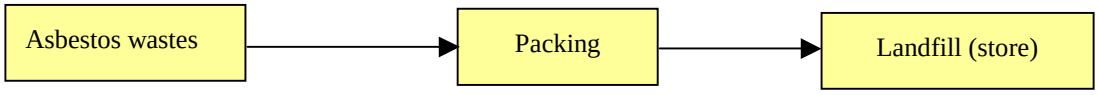
10) Pathogenic or Infectious Wastes



Remark:

There are two types of measures for pathogenic and infectious wastes, namely, autoclave and landfill. However, because landfill of organic HW is completely prohibited in the Master Plan, autoclave is the only way of proper treatment.

11) Waste Asbestos)



Remark:

Waste asbestos cannot be detoxified unless they are melted at the temperature of more than 1400 Celsius. It will take some time to develop such facilities in the Philippines. For this present moment, the Study Team suggests to firmly pack and temporarily stored them at the landfills.

8.2.3 Standards and Criteria for HW Landfill

(1) Establishment of HW Landfill Standards

1) HW Landfill Options

There are two major options of HW landfill. One is to establish stringent waste acceptance criteria, and the other is to set up comparatively moderate ones. There will be a big difference in HW treatment cost between which options to apply in the Philippines. The required levels of HW treatment and disposal for these two options can be summarized as follows.

Table 8.2.2 Required Levels of HW Treatment and Disposal by Options

Options	Details of the Option
Option A: Set up comparatively moderate waste acceptance criteria for HW landfill	Physicochemical treatment and solidification are required for pre-treatment of HW. For the landfill facility, stringent standard is to be applied so as to ensure the environmental safety.
Option B: Set up stringent waste acceptance criteria for HW landfill	Physicochemical treatment, solidification, and thermal treatment of organic are required for pre-treatment of HW. The standard applied for the facility is less strict than Option A.

Although incremental cost of HW treatment is higher in applying stringent waste acceptance criteria, it does not include the cost of monitoring and inspection of HW landfill that may be carried out permanently unless its environmental safety is completely ensured. It is very difficult to accurately compare the total lifecycle cost of HW treatment and disposal between the two options.

Taking into account the current difficulties in waste disposal, and not to carry over the possible danger to human health and environment to the future generation, stringent waste acceptance criteria should be applied for HW landfill in the Philippines. This option also complies with the basic policies on HWM given in Chapter 7.

2) Establishment of Differentiated Landfill Categories

The Philippines does not have an overall regulatory mechanism on waste disposal (landfill) yet. Therefore, the Study Team first recommends the overall mechanism of waste landfill, in which HW landfill will be properly put in place.

The Study Team recommends establishing the following 3 categorized landfills.

Table 8.2.3 Recommended Landfill Categories

Landfill Classification	Waste Acceptance Criteria
Class III	Hazardous waste (Toxicity must be minimized in the pre-treatment process.)
Class II	Municipal solid waste and industrial waste excluding hazardous ones
Class I	Inert waste (waste rubber, waste glass and ceramics, etc.)

Besides the 3 types of landfills above, there is another category of landfill called 'Isolated Landfill'. The isolated landfill, which is introduced in Japan and Germany, accepts the HWs in non-compliance with the waste acceptance criteria for any of the above 3 landfills. Accepted wastes are permanently or semi-permanently stored under strict monitoring and control. Radioactive waste is an example of such waste. It will be very difficult for private sector to build and permanently manage such facility. It should be under the control of national authority if it is built in the Philippines in the future. The overall concept of these categorized landfills is shown in Figure 8.2.1.

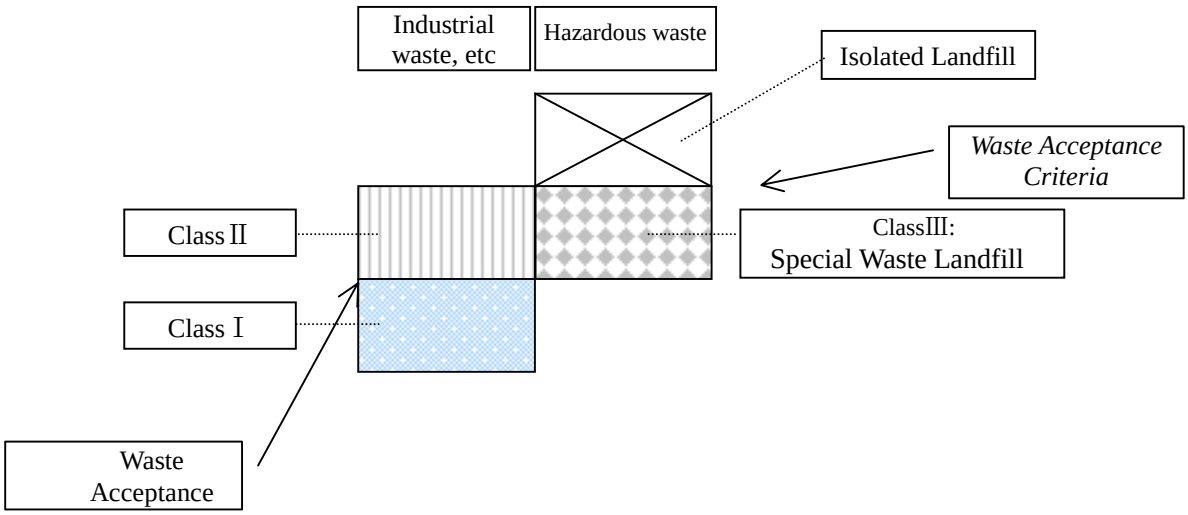


Figure 8.2.1 Conceptual Framework of the Categorized Landfills

The Class III landfill is designed to accept HW exclusively from other types of waste. It has to be separately built and managed in terms of risk mitigation and proper management of HW.

Even though the HW is detoxified and stabilized at its maximum, hazardous substances such as heavy metals will still remain within the waste. Therefore, it still needs separate control with other types of landfills so as to avoid possible elution of hazardous materials by mixing with other wastes, especially organic substances.

Furthermore, in terms of proper HWM, HW needs to be brought into landfill separately with other wastes. If it is allowed to dispose of HW and other types of wastes in the same landfill, proper HWM will be virtually impossible, especially in the present situation of no overall regulatory mechanism of waste landfill in the Philippines.

Since the Class III landfill accepts HW as far as it is detoxified and stabilized at its maximum, it is not appropriate to call it HW landfill. Instead, the Study Team recommends calling it 'Special Waste Landfill'. In this case, special waste means the detoxified and stabilized HW, not the non-treated HW.

(2) Establishment of Waste Acceptance Criteria for Special Waste Landfill

1) Hazardous Substances to be Controlled in Class III Landfill

In landfill management, prevention of diffusing the pollution to surface and ground water is primary concern. The main route of exposing the pollutants to the human is

fresh water drinking. Therefore, the existing drinking water standard for human health should be the basis of waste acceptance criteria for Class III Landfill.

The substances that are listed in the table above as well in DAO92-29 are Nitric Acid, Hydrofluoric Acid, Arsenic and its compounds, Boron compounds, Cadmium and its compounds, Chromium compounds, Lead compounds, and Mercury and mercuric compounds. Another important substances that is not listed in the drinking water standard, but listed in DAO92-29 is PCBs (Polychlorinated biphenyls and related materials). It also has to be controlled in the waste acceptance criteria. These will be the basis of the substances controlled in the waste acceptance criteria.

Regarding the organic hazardous wastes, it is not necessary to include them into the controlled substances in the criteria, as far as they are brought into landfill after making them completely inert. However, highly toxic materials like PCBs and dioxin compounds are necessary to be controlled by the criteria.

2) Other indicators to be Applied

There are some other items to be controlled by the waste acceptance criteria. An important item is to regulate inert levels of the HW. As used in European countries and Japan, the Study Team recommends applying the indicators of ignition loss and TOC (Total of organically bound carbon) to regulate them.

Another item to be considered is the physical state of the HWs. Taking into account smooth and safe use of the heavy machinery at the landfill, proper physical requirement of HW needs to be established.

3) Examples of HW Acceptance Criteria for Landfill

In the case of waste acceptance criteria, its compliance is examined by elution tests of the HWs because contamination of the water by leachate is of great importance in proper landfill management.

The acceptance levels at Class III landfill will not be the same as the drinking water standard. The Class III landfill will be equipped with the maximum facilities to prevent and minimize leaks or elution of hazardous materials into the environment.

Table 8.2.4 Examples of HW Acceptance Criteria for Landfill

	Philippine	Japan	Japan	Germany	U.S.
	Drinking water criteria	Environmental water quality standard	Acceptance level (mg/l)	Acceptance level (mg/l)	Acceptance level (mg/l)
Arsenic (A)	0.01	0.01	0.3	0.5	5.0
Lead (Pb)	0.01	0.01	0.3	1	5.0
Cadmium (Cd)	0.003	0.01	0.3	0.1	5.0
Hexavalent Chromium (Cr^{+6})	0.05	0.05	1.5	0.1	5.0
Mercury (Hg)	0.001	0.0005	0.005	0.02	0.2
Cyanide, easily releasable (CN)	0.07	ND	1	0.5	-
Barium (Ba)	0.7	-	-	-	100.0
Selenium (Se)	0.01	0.01	0.3	-	1.0
PCB	-	ND	0.003	-	
Dioxins	-		3ng/kg	-	

ND: not detected by the specified testing device.

In the case of Japan, it is considered that heavy metals are usually captured in soil and mostly will not elute into surface or ground water. Accordingly, the acceptance levels of heavy metals at the landfill are set up at approximately 30 times as of drinking water standard. Regarding cyanide and mercury, however, the acceptance levels are established at 10 times of drinking water standard, taking into account their comparatively high tendency of elution.

As far as the above acceptance levels are kept, the elution of hazardous substances will be minimized enough to protect safety and quality of surface and ground water.

4) Waste Acceptance Criteria for Class III Landfill (7 hazardous substances)

Table 8.2.5 below recommends the waste acceptance for Class III Landfill. The criteria are established for 7 hazardous substances to be controlled. The acceptance levels given here is almost the same as of Japan and Germany. Acceptance levels of PCBs and dioxin compounds are shown here as the references for the future determination in the Philippines.

Table 8.2.5

Comparison of Recommended Waste Acceptance Criteria with Other Countries'

	Philippine	Philippine	Japan	Germany
	Drinking water criteria	Proposed Acceptance level (mg/l)	Acceptance level (mg/l)	Acceptance level (mg/l)
Arsenic (As)	0.01	0.3	0.3	0.5
Lead (Pb)	0.01	0.3	0.3	1
Cadmium (Cd)	0.003	0.1	0.3	0.1
Hexavalent Chromium (Cr^{+6})	0.05	1.5	1.5	0.1
Mercury (Hg)	0.001	0.01	0.005	0.02
Cyanide, easily releasable (CN)	0.07	0.7	1	0.5
Barium (Ba)	0.7	2.0	-	-
Selenium (Se)	0.01	0.3	0.3	-
PCB	-	-	0.003	-
Dioxins	-	-	3ng/kg	-

Arsenic, Lead, Cadmium, Chrome (hexavalent) are 30 times higher than drinking water. However, figures are rounded off from 0.09 to 0.1 for Cadmium, and 2.1 to 2.0 for Barium. For Mercury, Cyanide, and easily releasable substances, the values are set 10 times higher than drinking water's.

5) Other Criteria to be Applied

The Study Team recommended that no criteria would be established for organic hazardous substances with the exception of PCBs and dioxin compounds. Instead, the Study Team recommends prohibiting direct disposal of organic HWs at any of landfill unless they are detoxified and stabilized by intermediate treatment. In addition, the acceptance criteria for organic content of HWs will be established at stricter level by tightening the related indicators such as ignition loss and TOC.

The ignition loss of 5% is a very strict standard because even the ashes from normal incinerators still show more than 10%. However, to prevent contamination by dioxin compounds, ignition loss has to be kept at least below 10%. In the case of the Philippines, taking all of these into account, the Study Team recommends setting up the ignition loss of 7 to 8% between 5 and 10% and TOC of 5 to 6% as the initial criteria.

As to the indicator for regulating physical state of HWs, the water content should be controlled below 85% so that landfill operators can drive heavy machinery and equipment on-site.

6) Waste Acceptance Criteria for Class I and Class II Landfills

Class I landfill only accepts non-hazardous inert wastes such as scrapped metals, glass and ceramic wastes, rubbles and the likes. Any organic wastes will not be accepted in Class I landfill. Ignition loss to be applied in Class I will be less than 5%. Class I landfill also refuses any of HWs to be disposed of. Therefore, no criterion will be established for hazardous substances.

Class II landfill will allow disposal of non-hazardous industrial waste and municipal solid waste. The acceptance criteria for hazardous substances will be the same as Class III landfill with the exception of organic substances. Class II landfill will accept organic wastes as long as they are identified as non-hazardous. However, the HWs that are pre-treated to comply with the criteria for Class III landfill will never go to Class II landfill so as to avoid mixture with organic substances.

Table 8.2.6 Recommended Waste Acceptance Criteria for 3 Classes of Landfills

Landfill type	Class Ⅲ	Class Ⅱ	Class Ⅰ
Acceptable Wastes	Detoxified HW	MSW, non hazardous ISW	Inert waste
Ignition Loss	≦ 7-8%	-	≦ 5%
Total of organically bound carbon TOC (C)	≦ 5-6%	-	-
Moisture contents	≦ 85%	≦ 85%	-
Arsenic (As)	0.3 mg/l	0.3 mg/l	-
Lead (Pb)	0.3 mg/l	0.3 mg/l	-
Cadmium (Cd)	0.1 mg/l	0.1 mg/l	-
Chrome, hexavalent (Cr)	1.5 mg/l	1.5 mg/l	-
Mercury (Hg)	0.01 mg/l	0.01 mg/l	-
Cyanide, easily releasable	0.7 mg/l	0.7 mg/l	-
Barium (Ba)	2.0 mg/l	2.0 mg/l	-
Selenium	0.3 mg/l	0.3 mg/l	-

8.3 Technological Requirements for TSD Facilities and Their Operation

There is no technological requirement provided by law to regulate TSD facilities and their operation in the Philippines. It hinders private sector from making proper investment in developing TSD facilities. Therefore, the Study Team here made recommendations regarding the technological requirements for TSD facilities and their operations.

8.3.1 Technological Requirement for Class III Landfill Facilities and Their Operation

Class III landfill facilities are required to comply with the technological criteria given in Table 8.3.1.

Table 8.3.1 Technological Requirement for Class III Landfills

	Category	Detail
Site selection	Protection of ground water aquifer	- Select a site where its geological feature prevents the groundwater contamination by elution of toxic materials from the landfill.
Facility standards	Fences on the perimeter of the site	- Clarify the boundary between the facility and surrounding area by fence. - Prevent people from coming into the facility.
	Prevent accidental release of waste	- Build retaining walls and/or dams to prevent accidental waste releases to the surrounding environment. Construct the facility in such way to withstand against the weight of waste itself, soil pressure, wave force, and earthquakes.
	Drainage system for rain water	- Construct drainage system to prevent rainwater from running into the facility.
	Liner facilities	- Install the liner on 50cm of stratum with the permeability coefficient of less than 10^{-6} cm/second, or on more than 5cm of asphalt/ concrete layer with the permeability coefficient of less than 10^{-7} cm/second. - Install double liners.
	Leachate collection facility & treatment facility	- Construct leachate collection facility. - Construct a treatment facility for the collected leachate. (Treated effluent must meet the effluent standards of DAO90-35.)
	Monitoring facility	- Monitoring facility for the liner maintenance. - Install more than two monitoring wells.
Operation	Protecting the liner facility	- Take appropriate measures for protecting the liner facilities from breakage.
	Verify conditions of the liner	- Periodically conducted.
	Intermediate earth cover	- Conducted as the occasion demands.
	Leachate treatment management	- Periodically conducted.
	Leachate monitoring	- More than twice a year.
	Groundwater monitoring	- Once a year for the standard items. - Once a month for conductivity and pH value.
After operation period	Earth cover after landfill	- Cover with earth for more than 50 cm.
	Monitoring	- Examine groundwater for once a year. - Check for leachate.
	Maintenance and Management	- Conducted in accordance with the guidelines to be formulated.

8.3.2 Technological Requirement for Physicochemical Treatment

The physicochemical treatment processes generates hydroxides. The hydroxides are further filtrated to remove its toxicity. Finally, filtration residues remain in the form of sludge to be disposed of at landfills.

Technological requirement for these physicochemical treatment facilities are given in Table 8.3.2 below.

Table 8.3.2 Technological Requirements for Physicochemical Treatment Facilities

Items	Requirement
Structure of Facility	- The facility should be build on or with impermeable ground/floor. - Install a facility/system to control supply of waste acid, waste alkali, neutralizers, and oxidizing agents. - Install reaction chamber equipped with stirring mechanism
Operation / Maintenance	- Corresponding to pH value measured in the reaction chamber, adjust supply of waste acid, waste alkali, or other chemicals. - Thoroughly mix the wastes. - Protect the surrounding living environment by taking necessary measures against the gasses that are generated in the process of oxidizing decomposition of cyanide, and treatment of nitric and hydrofluoric acids.

8.3.3 Technological Requirement for Solidification

Technical requirement for solidification is given in Table 8.3.3 below.

Table 8.3.3 Technological Requirement for Solidification Treatment Facilities

Items	Requirement
Structure of Facility	- Facility is to be constructed on and/or with impermeable ground or floor, respectively. - Facility has to be designed to evenly mix sludge, dust, cement, and water.
Operation / maintenance	- Collect elusion from sludge in the wastewater discharging process. - Take enough aging.

8.3.4 Technological Requirement for Thermal Decomposition

Thermal decomposition is the only available way to detoxify organic HWs. To comply with the waste acceptance criteria for Class III landfills, organic HWs need to be thermally destructed. As far as in accordance with the criteria recommended here in the master plan, many kinds of existing HWs will be subject to thermal decomposition.

The Philippines Clean Air Act stipulates in Article 3 of Section 20 that 'Incineration, hereby defined as the burning of municipal, biomedical and hazardous waste, which

process emits poisonous and toxic fumes is hereby prohibited'. Under this article, waste incineration by conventional technology is completely prohibited.

However, the Study Team recognized that the article does not prohibit to pyrolize waste by making use of some heat media in the form of pyrolysis process and the likes, as far as no poisonous and toxic fumes are discharged to the environment. It is considered that poisonous and toxic fumes indicate Section 19 of the Act, which provides flue gas emission standard. Therefore, thermal decomposition treatment can still be applied in the Philippines as far as it is advanced enough to comply with the Act including the flue gas emission standard.

Additional technological requirement for thermal decomposition facilities to comply with the Clean Air Act will be as follows:

- To comply with the flue gas emission standards of Section 19,
- Ignition loss of treatment residues must be less than 5%,
- Furnace temperature must be kept at above 1,200 Celsius.

In the above conditions, even the flame resistant HWs can be almost completely destructed by heat. Generated residues are in the glass fibred form and mostly do not contain any organic compounds. These advanced treatment technology has already been introduced in Japan and European countries and technologically feasible to apply in the Philippines. The overall technological requirement for thermal decomposition of HWs is given in Table 8.3.4.

Table 8.3.4 Technological Requirement for Thermal Decomposition Facilities

Item	Requirement
Facility Structure	- Constant supply of waste is secured. - Pyrolysis gas can be retained in the chamber for 2 seconds while holding temperature of more than 1,200 ℃. - Furnish auxiliary fuel firing equipment to maintain 1,200℃. - Equip machines to continuously measure and record the temperature of gas in the chamber. - Temperature of gas sent to the dust collector need to be cooled down to less than 200℃. - Equip machines to continuously measure the temperature of gases flown into the dust collector. - Install exhaust gas treatment device to meet the emission standards. - Continuously measure concentration of carbon monoxide in the exhaust gas. - Dust need to be separated from slug.
Operation / Maintenance	- The temperature of pyrolysis gas must be kept at more than 1,200℃. - Hold the ignition loss at less than 5 %. - Continuous operation. - Continuously measure and record the gas temperature in the chamber. - Retain the gas temperature at less than 200℃ in the dust collector while constantly measuring and recording it. - Periodically remove dust from the dust collector. - Operate the chamber in such way to keep the concentration of carbon monoxide in the exhaust gas at less than 100ppm. (4 hours average on 12% oxygen equivalent). - Constantly measure and record carbon monoxide concentration. - Periodically measure concentration of exhaust gas.

8.3.5 Technological Requirement for HW Haulage

There is no legally authorized requirement for storage and haulage of HWs in the Philippines. At least, the following rules and regulations should be provided so as to eliminate possible risks of HWs during their storage and transportation.

- Prohibition of mixed loading of HWs,
- Obligation to segregate HWs by defined categories in the different containers,
- Obligation to clearly mark the specification of HWs stored or hauled (on containers or transportation vehicles)
- Obligation to attach manifest sheets for each of transported HWs.

Table 8.3.5 specifies the required quality of containers for each type of HWs, which is also necessary to be controlled by the relevant regulations. Specific requirement are also needed for HW hauling vehicles. The Study Team suggests that HW hauling

vehicles should be designed and exclusively used to transport HWs.

Table 8.3.5 Required Quality of Containers by Types of HWs

	Open drum	Closed can	Chemical can	Plastic containers	Oil can	Flexible container	Bulky refuse container	Infectious wastes container
Waste acid, Waste alkali			+	+				
Waste oil	+	+			+			
Sludge	+						+	
Dust	+						+	
Solvent	+	+		+	+			
Solids	+					+	+	
Infectious waste								+

8.4 Promotion of TSD Facilities for HWs

Development of off-site TSD facilities is the most urgent issue to be addressed in the Philippines. This section discusses the measures to promote TSD facilities development and its scenario.

8.4.1 Present Conditions and Issues of HW Treatment

(1) Present Conditions of HW Treatment

The present conditions of HW treatment on the basis of the data from the currently registered 1,079 HW generators are summarized, and it should be taken into account that it only represented the results of registered generators and not cover the whole Philippines. However, because this is the only comparatively reliable data on HW generation and treatment, the Study Team decided to use this as a base for the Master Plan.

The amount off-site HW treatment reaches about 140 thousand tons per year in the amount of 278 thousand tons generated in total. Since the amount of off-site treatment includes around 3.6 thousand tons of off-site recycling, the actual amount will be 136 thousand tons.

This amount of off-site treatment does not necessarily represents that it is properly treated off-site. In fact, 39 thousand tons of the above did not identify the treatment

measures.

Subsequently, region-by-region characteristics of HW generation and treatment are given below. To analyze regional characteristics, the Study Team divided the Philippines into 4 greater regions as given in Figure 8.4.1.

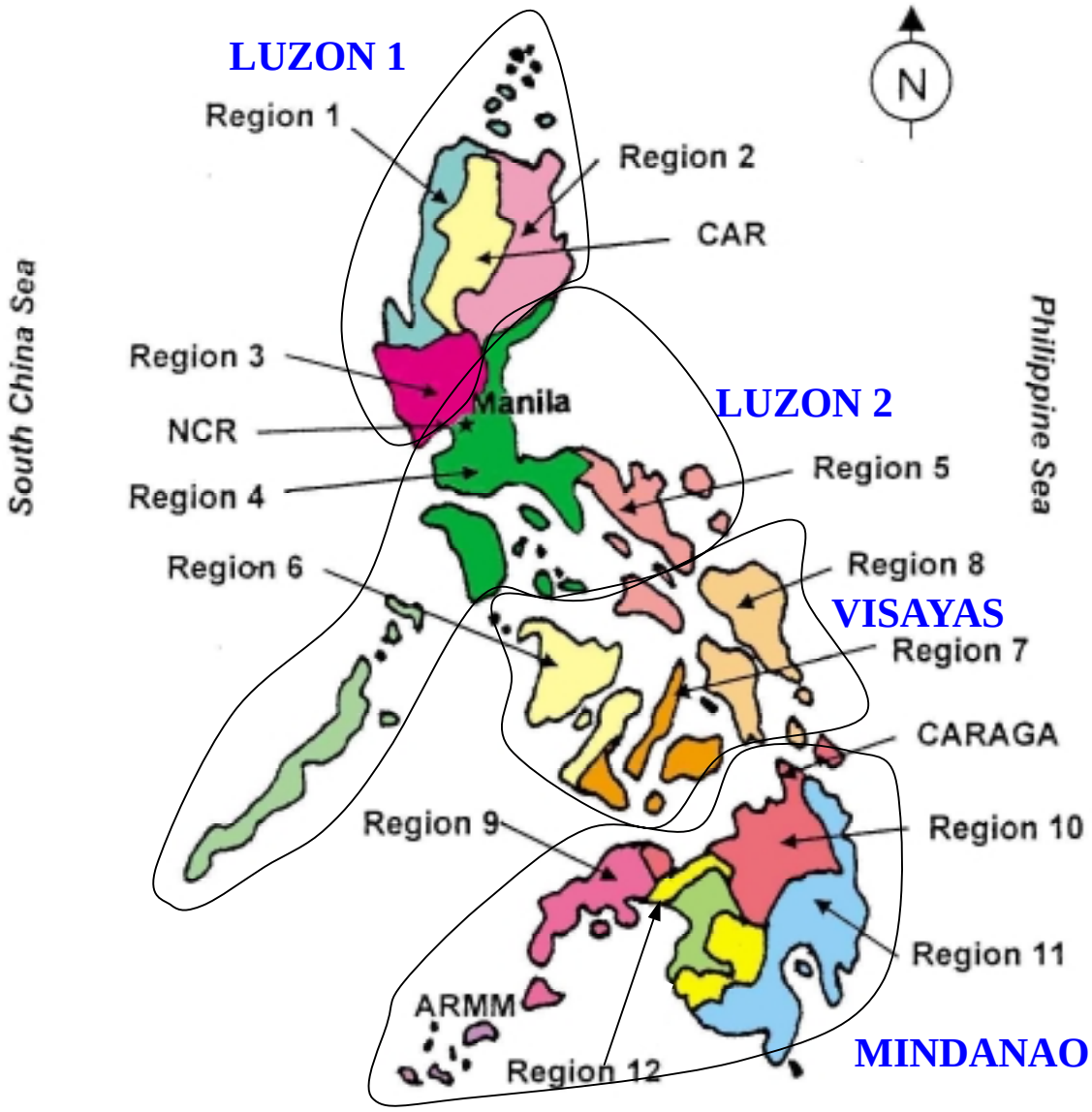


Figure 8.4.1 Regional Grouping of the Philippines

Table 8.4.1 outlines the region-wise conditions of HW generation and treatment. Each region has a considerable amount of off-site treatment. Therefore, it also needs proper HW treatment and disposal facilities.

The amount of off-site HW treatment is the most in Luzon 2 Region, where industrial and business activities are most active. It means that Luzon 2 Regions is currently

under the largest threat of HW in the Philippines. Although they are not as much as Luzon 2 Region, other regions also generate a sizable amount of HW to be treated off-site.

Regarding Region 7, Cebu Island, there is a new private chemical treater of HWs (Cebu Common Facility). Therefore, chemical treatment capacity is now increasing in Cebu Island.

As to disposal facilities, there have been no landfill facilities to properly handle HWs in the whole Philippines so far. It is presumed that HW generators have no choice but store the HWs on-site or improperly treat and dispose them.

Table 8.4.1 Region-Wise Conditions of HW Generation and Treatment

Unit: tons/year

Region	Grand Total	01-Recycle	On-site	Off-site
Luzon 1	23,499	10,197	5,654	7,647
Luzon 2	188,006	51,560	44,958	91,489
Visayas	27,445	3,035	3,363	21,048
Mindanao	39,444	4,763	14,526	20,154
Total	278,394	69,555	68,501	140,338

(2) Issues on HW Treatment

Out of the on-site treatment amount of around 68,000 tons per year, 5,000 tons are considered to be incinerated from our analysis of the registration data. With the enactment of the Clean Air Act, these 5,000 tons will come out as the amount to be properly treated off-site.

Regarding the total amount of off-site treatment amount of around 140,000 tons per year, there is approximately 50,000 tons of HW stored on or off-site due to lack of proper treatment and landfill facilities.

As stated above, this Master Plan clearly prohibits direct disposal of organic HWs at landfill. Thermal treatment of organic HWs is required to comply with the waste acceptance criteria for landfills. However, construction and operation of thermal treatment facilities will not be possible in terms of treatment cost unless the annual treatment amount reaches 15,000 to 20,000 tons. Therefore, it will not be able to be built in all regions above.

To implement proper HWM in the Philippines, a full-scale development of HW

treatment facilities are needed including:

- HW landfills,
- Chemical treatment facilities,
- Solidification facilities, and
- Thermal treatment facilities.

Although these facilities are necessary in each region above, many of them cannot build and operate those facilities at the allowable treatment costs because of limited treatment demand.

The Study Team establishes the feasible HW treatment demand by types of facilities as follows:

Table 8.4.2 Lower Limits of Treatment Capacity
For Feasible Operation of HW Treatment Facilities (Estimated)

Treatment Type	Treatment Volume
Thermal Treatment Facility	15,000～20,000 t /yr
Landfill Facility	10,000 t /yr
Chemical Treatment Facility	1,500～3,000 t /yr

The Study Team estimated the region-wise demand for HW treatment by types of facilities on the basis of detailed data analysis on the on-site treatment amount. Table 8.4.3 shows its results.

Table 8.4.3
Estimated Region-Wise HW Treatment Demands by Types of Facilities
unit: tons/year

	Physico -chemical	Thermal	Landfill	Total
LUZON1	545	6,977	125	7,647
LUZON2	40,705	25,359	25,425	91,489
VISAYAS	4,940	4,445	11,662	21,048
MINDANAO	335	11,394	8,425	20,154
TOTAL	46,526	48,174	45,638	140,338

Remark:
The landfill demands given above include the amount to come directly to landfill from HW generators. Residues generated from physicochemical and thermal treatment are not included.

This projection only includes potential demands from the registered HW generators. Considering the demand from the potential non-registered HW generators, it will be much larger in each region. However, to remove uncertainty as much as possible from the demand projection, the Study Team decided to formulate TSD facility plan on

these figures.

The treatment demand in Luzon1 is not enough to build and operate any of the HW treatment facilities to handle HWs generated inside the region. Meanwhile, Luzon 2 has enough demand to build and operate any of the HW facilities.

In the case of Visayas, physicochemical treatment facilities and landfills can be operated. Mindanao has a certain possibility of developing thermal treatment and landfills although the projected demand is a little bit short of the required amount. However, since both regions are archipelagoes consisting of geographically dispersed into small islands, additional cost will be needed to collect HWs to the facilities. It implies that it is also difficult to operate HW treatment and landfill facilities in these regions.

8.4.2 Region-Wise Policies on TSD Facilities Development

(1) Basic Policies on TSD Facilities Development by Regions

Table 8.4.4 outlines the basic development policies on TSD facilities by Regions. An important issue to be solved is how to manage the HWs generated from the regions where it is difficult to build and operate TSD facilities.

Table 8.4.4 Basic Development Policies on TSD Facilities by Regions

Region	HW required for physicochemical treatment	HW required for thermal treatment	HW required for Landfill
LUZON1	・To be treated in the facility in Luzon 2	・To be treated in the facility in Luzon 2	・To be treated in the facility in Luzon 2
LUZON2	・To be treated in the model integerated HW treatment facility in the region.	・To be treated in the model integerated HW treatment facility in the region.	・To be treated in the model integerated HW treatment facility in the region.
VISAYAS	・To be treated in the existing facility in Cebu.	・To be temporarily stored or transported to the facility in other regions, or disposed at landfill tentatively.	・To be treated in the landfill to be preared in the region.
MINDANAO	・To be temporarily stored or transported to the facility in other regions.	・To be temporarily stored or transported to the facility in other regions, or disposed at landfill tentatively.	・To be treated in the landfill to be preared in the region.

(2) Basic Policies of designing the locations of TSD facilities

In properly locating and controlling TSD facilities, the following issues need to be taken into account:

- Transportation distance and transshipment of waste has to be minimized,
- The number of TSD facilities has to be controlled and limited,
- Total cost of HWM has to be duly considered.

(3) Transitional HWM Policies Before the Development and Operation of TSD Facilities

HWM policies in the transitional period before the development and operation of TSD facilities will be as follows:

a) To maximize on-site recycling and treatment of HW by generators.
b) Non-recyclable and non-treatable HWs will be stored on site or transferred to the regional HW storage centers to be built by public or private initiative. The centers will regularly transport the HWs to the TSD facilities when they start operation.
c) Comparatively low cost treatment facilities such as physicochemical treatment will be built in the regional HW storage centers if it is financially feasible to build and operate.
d) Some of the organic HWs, that has to be thermally treated essentially, will be disposed at landfills as a transitional measure if hazardous level is comparatively low enough.
e) Because some of the cement kilns in the domestic cement production industries can thermally treat organic HWs of high calorific value, cooperation with these cement industries will also be useful to promote proper HW treatment.

(4) Region-Wise Development Scenario of TSD Facilities

Taking into account the whole preparation process before starting TSD facilities operation, including project planning, feasibility study, EIA, fund raising, ECC, obtaining consensus from nearby residents, facility construction permits, and construction itself, it will take at least 4 to 5 years. This long-term preparation is a reason why the investors hesitate to participate in TSD facility business.

Even though the project preparation starts from now on, the facility will be able to start its operation in 2005. If the project is carried out under the government initiative, the government cannot commit with other facilities development any deeper. Therefore, starting preparation of the second TSD facilities can be only possible sometime around 2003. Initiating operation of the second facility will be 2007.

Taking this project cycle into account, region-wise development scenario of TSD facilities in the Philippines can be described as Table 8.4.5.

Table 8.4.5 Region-Wise Development Scenario of TSD Facilities

Region	1st Period	2nd period	3rd Period
	2001-2004	2005-2007	2008-2010
LUZON1	・HW to be stored on-site	・Storage/ transfer facility to be built. ・HW to be transferred to Luzon 2.	・Same as left
LUZON2	・Model facility to be built by government initiative.	・2005: Model facility begins operation	・Model facility in operation
		・2nd facility planned.	・2nd facility to be built and operated.
VISAYAS	・Expansion of the existing plant in Cebu	・Same as left	・Same as left
	・Development plan for landfill facility in 2003	・Development and operation of a landfill with tentative standards by private sector	・Facility to be expanded
	・HW to be stored on-site	・HW subject to thermal treatment to be transferred to Luzon 2.	・Same as left
MINDANAO	・Development plan for landfill facility in 2003	・A landfill to be developed and operated.	・Facility to be expanded
	・HW to be stored on-site.	・Storage/ transfer facility ・Transfer to Luzon 2	・Same as left

The above scenario can be redrawn in view of national development perspective of TSD facilities as follows:

1st Step	Develop a Model Integrated HW Treatment Facility (MIF) in CALABARZON, Luzon by 2002-2004
2nd Step	The next step is to establish a storage/ transfer facility in the regions where development of treatment facility in the foreseeable future is difficult. The HW will be regularly transported to MIF above. In VISAYAS and MINDANAO regions, a landfill will be developed to accept HW temporarily until proper treatment facility becomes available.
3rd Step	Develop the 2nd integrated treatment center in Luzon2 by a private sector initiative. HW treatment facilities will be further developed and operated nationwide as a response to the increasing HW treatment demand.

Figure 8.4.2 shows the distributions of TSD facilities development in the target year of 2010.

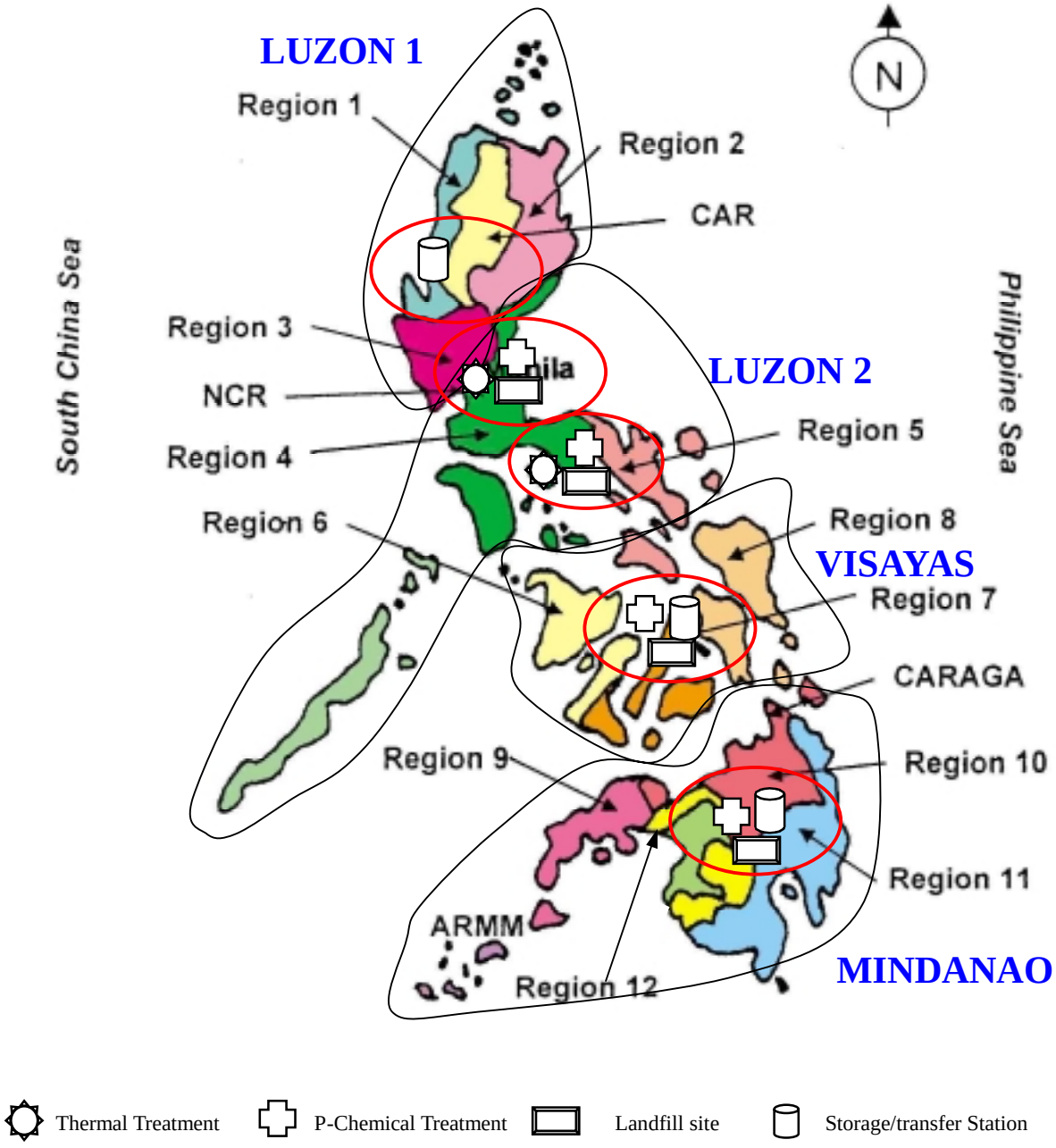


Figure 8.4.2 The Distributions of TSD Facilities in 2010

(5) Treatment of Specially Controlled HW

1) PCBs Treatment

Although the Master Plan does not discuss in detail about PCBs treatment, it is also an important HW issue to be properly dealt with by the regulating authority.

2) Asbestos

Asbestos waste is irregularly generated when buildings or plants are demolished. There is a big fluctuation in its quantity of generation according to the occasions. Considering these present conditions, there will be no way but temporarily stored it until its potential quantity of generation becomes clear and large enough to build melting furnace facilities. The regulating authority may have to designate storage for asbestos waste.

3) Medical Waste (Pathogenic/Infectious Waste)

Although medical waste is not the subject of this Study, the Study Team makes some recommendations here.

Currently, there is at least one treater who incinerates medical wastes in the Philippines. Also, there are some large hospitals having their own small scale incinerators to specially treat medical wastes generated on site.

With the enactment of the Clean Air Act, incineration of medical waste is now prohibited. Originally, since the existing incinerators do not comply with the emission standard for dioxin compounds, proper medical waste management has to be fundamentally re-examined in the Philippines.

In fact, the model facility that is introduced in this Master Plan can also properly treat these medical wastes. The use of this facility can also be taken into account when the regulating authority formulates medical waste management policies and plans.

8.4.3 Measures Against Increasing Demand

With the increase in the number of registered HW generators and strengthened law enforcement on HWM, the HW treatment demand will also be expected to rise.

According to the estimation by the Study Team, HW treatment demand will reach approximately 1,200 thousand tons per year, which is about 7 times of the current estimated demand if the target of 6,500 registered HW generators is complied. This incremental demand for HW treatment will be only realized when the model facility starts its operation and the proper HWs flow begins to take its shape by the strengthened law enforcement on HWM by the regulating authority.

Once the incremental HW treatment demand is realized in the market, it will be easier for the regulating authority to promote private sector participation in TSD facilities development because the investors can get a clear prospective of TSD operation

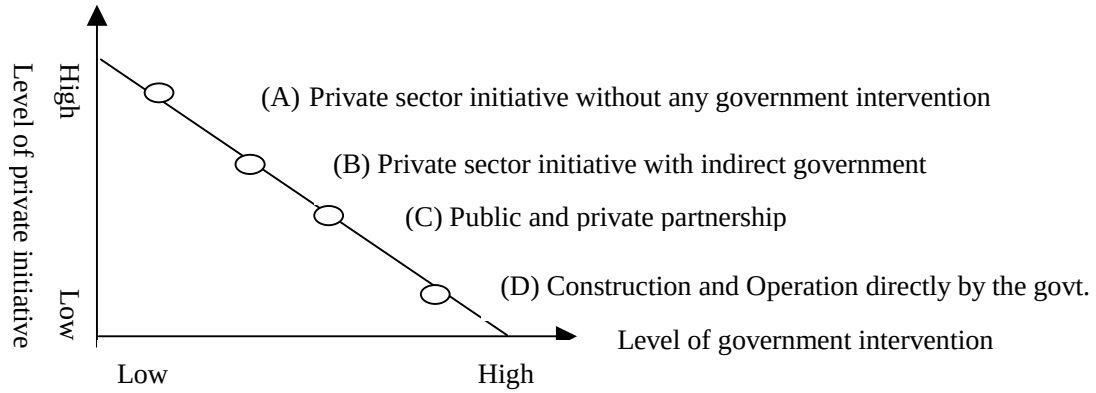
businesses.

8.5 Development of TSD Facilities under Government Initiative

8.5.1 Options of Government Intervention in the Development of TSD Facilities for HW

There are four types of government intervention in the development of TSD facilities, namely:

(A) Private sector initiative without any government intervention,
(B) Private sector initiative with indirect intervention by the government,
(C) Public and private partnership,
(D) Construction and operation directly by the government.



The level of government intervention is the highest in Option (D) while level of private initiative is the highest in Option (A), as shown in the figure above.

The Government of the Philippines presently applies Option (A), in which feasibility of TSD facilities is completely in the hands of market mechanism. However, as far as looking into the present conditions of TSD facilities in the Philippines, Option (A) does not work effectively in promoting their development.

On the other hand, Option (D), a full-fledged government intervention in the development of TSD facilities has to be avoided in the case of HWM sector since it is basically of private sector's businesses and not public ones in terms of well-known "Polluter Pays Principle"

The master plan recommends Option (C), development of TSD facilities by private-public partnership to be applied in the Philippines. This is because

private-public partnership is indispensable to develop thermal treatment and landfill facilities for HW, both of which are presently difficult to build and operate only by private sector.

Lastly, Option (B), private sector initiative with indirect government intervention, is the most basic stance of the government intervention in HWM. However, the Study Team suppose that Option (B) will not work effectively for development of TSD facilities since market conditions of HWM have not yet been well developed enough to apply Option (B) in the Philippines. Development of HWM business market will be the first thing to be dealt with by the government.

The details of the above four options are further discussed respectively below.

(1) Private sector initiative without any government intervention (Option A)

Development and operation of TSD facilities fully by private sector is one of the ideal ways of HWM. Japan basically applies this option in HWM.

However, this option inevitably causes instable HW treatment and disposal practices before the market mechanism is fully developed and properly control HWM businesses. The Philippines is now in such a stage where proper HW treatment can rarely be expected. Furthermore, there is no promise that the Philippines will eventually transform onto a level where the market mechanism properly controls HWM without any government intervention.

In addition, this option may lead private sector to develop small-scale TSD facilities, which only require small capital investment, but only deal with small amount or limited types of HWs like the existing TSD operators in the Philippines. As a result, HW generators are obliged to find different treaters for each type of HW and transport it separately. It complicates the HW stream and increases loopholes of improper treatment.

To properly control HW stream in the above situation, a large number of staff is needed to oversee HWM practices by scattered TSD operators. In the case of Japan, more than 3,000 government staff members are allocated to manage industrial waste. Since around 400 million tons of industrial wastes are generated every year, every 7 to 8 persons have to control one million tons on average. Even with these 3,000, illegal dumping of waste cannot be eliminated or even difficult to be mitigated and becomes a big social problem in Japan. The manifest system presently operated in Japan is not enough to completely control improper practices by private TSD operators. Once private TSD operators are scattered over the HWM business market, it needs an

enormous administrative cost to control them. It will be also difficult to develop an integrated treatment facility dealing with various HWs in such a situation because of the conflict of interest with the existing TSD operators. Thus, in terms of human health and environment protection as well as effective administration of HWM, government intervention is obviously needed in the development of TSD facilities for HW.

The necessity of government intervention can be raised from another point. In the current market conditions, the TSD facilities requiring only a small capital investment and dealing with small amount of easily recyclable or treatable HWs will be gradually developed in the Philippines while development the facilities which need large capital investment such as thermal treatment or disposal facilities will be delayed or not realized by private sector. The main issues hindering the private sector participation in building and operating these facilities include:

- Unclear demand for HW treatment and disposal,
- Large capital requirement for TSD facility development,
- Investment and operation risks of TSD facility development and operation,
- Weak law enforcement and administration on HWM

All of the above issues indicate the big market risk of HW treatment and landfill facilities construction and operation. Therefore, the government has to consider the policy measures to mitigate these market risks, especially for the development of the facilities requiring large capital requirement and big risk taking, such as the integrated HW treatment facilities that collectively deal with various HWs. The remaining three options mentioned below represent the types of policy measures to mitigate these risks.

(2) Construction and operation directly by the government (Option D)

Option D is a full-fledged government intervention in the development of TSD facilities. In this case the government, as a public project, directly carries out TSD facilities development and operation. However, this option is not appropriate in the case of HWM sector since it is basically of private sector's businesses and not public ones in terms of well-known "Polluter Pays Principle". It is not the government or public but the generators who have the primary responsibility for proper treatment of HW. This type of government intervention is only allowed if the impacts of HW on human health and environment raise serious public concern. In this respect, the issues of HWM do not yet become serious public concerns in terms of their impacts on human health and the environment. Therefore, it is difficult in the present conditions to justify a full-fledged government intervention in developing TSD facilities.

(3) Private sector initiative with indirect government intervention (Option B)

Option B includes the following indirect government intervention in promoting the development of TSD facilities under private sector initiative:

(a) Controlling and regulating issuance of TSD operation permits or licenses,
(b) Providing exclusive concession of TSD operations in accordance with the BOT Law,
(c) Providing economic and financial incentives to the private TSD operators.

Although these economic and financial incentives may be useful to promote small-scale TSD facilities requiring small capital requirement, they are not enough to mitigate the risks of a large investment in TSD facilities such as thermal treatment and landfill. Therefore, these incentives will not contribute to early development of proper TSD facilities in the Philippines.

Accordingly, to develop proper HW treatment and landfill facilities as early as possible, not indirect but direct government intervention will be needed

(4) Public and Private Partnership (Option C)

The master plan recommends Option C, public and private partnership in developing TSD facilities in the Philippines. Option D is combination of TSD facility development by the government and operation by private sector. In this case, the government covers financial risk of TSD facility development while the private sector proponent covers operation risk. By applying this system, market risk of TSD facility business can be evenly covered by public and private sectors.
Even though the scale of market is not clear, private sector will participate in operation of the TSD facility with the conditions of risk-taking of TSD facilities development by the public sector. This option is the only way to realize early development of proper HW treatment and landfill facilities in the Philippines.

Considering the present conditions of HWM in the Philippines, the development of proper HW treatment and landfill facilities is an urgent issue to prevent possible impacts on human health and environment. For early development of such facilities, the Philippines Government should take Option C, the public and private partnership in TSD facility development and operation, which will mitigate market risks and provide private sector proponents with the opportunity for participating in TSD operation businesses.

8.5.2 Development of Model TSD Facilities by the Public and Private Partnership

Although the master plan recommends public and private partnership in developing TSD facilities in the Philippines, it should be kept in mind that the main objective of government intervention here is to promote private sector participation in TSD facility development and operation by providing the model of TSD facility business on HW. Therefore, public and private partnership will be limited to the development and operation of model TSD facilities for HW in accordance with the following policies:

- The model TSD facility is to be fully operated by private sector partner so that other private sector proponents can learn from it,
- The scale of facility is to be minimized in the range of economically feasible operation,
- The facility is to be disclosed to the stakeholders as a place for learning about proper HWM.

To avoid impacts on the current and future HW treatment and landfill markets, the scale of model facility must be minimized in the range of economically feasible operation. If the treatment and landfill demands increase, they should be open to private sector proponents.

If the model facility is not developed by direct government intervention, development of proper TSD facilities will be delayed and cause the following negative impacts on the Philippines:

- Negative factors of foreign capital investment in the Philippines will be increased,
- Environment risk will be increased with the rise of improper HW treatment and disposal,
- The government reliability as the law enforcement institution will be decreased.

Considering the above negative impacts, the urgency of direct government intervention is very high in HWM sector in the Philippines.

The following positive effects are expected by the development of this model facility.

- To minimize possible environmental risk that may arise from improper or insufficient hazardous treatment by the present generators and treaters,

- To facilitate law enforcement of hazardous waste management as well as accelerate establishment of overall hazardous waste management system in the Philippines,
- To learn from the model TSD facility on HW treatment technologies, facility operation and maintenance, and so forth,
- To provide the citizens with the opportunities to deepen their understanding of TSD facilities,
- To use the model facility for the treatment of the HWs generated in other regions.

The model facility has to comply with the high level of technological and environmental requirements so that all the peoples including the nearby residents can support it.

The public and private partnership in the development of model TSD facilities has the following merits for the government:

- Governmental intervention in TSD facilities development will minimize possible environmental risk that may arise from improper or insufficient hazardous treatment by the present generators and treaters,
- The development of a model TSD facility will appeal a strong intention of the government to realize proper hazardous waste management,
- Anyone can learn from the model TSD facility on HW treatment technologies, facility operation and maintenance, and so forth,
- The officials of national and local government can accumulate a lot of practical experience, knowledge, and know-how of hazardous waste management from the model TSD facilities,
- Governmental hazardous waste management system will be strengthened through the development and operation of the model TSD facilities, and
- The course of TSD facilities development will be further clarified through the pilot operation of the model facility (actual demand, necessary treatment technologies, necessary capacity of the facility, etc.)

Furthermore, the model TSD facility also contributes to enhancing the HWM administration by the government through the following methods:

- The model TSD facility can be utilized for capacity building of the government officials.
- The model TSD facility will facilitate the centralized management of Waste Tracking System,
- Strict law enforcement to HW generators may be possible when the model facility starts its operation.

The establishment of a HWM training center will be a good idea in terms of providing government staff, treaters, and generators with the opportunities to learn together about HWM.

8.5.3 Structure of the Model TSD Facility Development Project

The figure below outlines the structure of the model TSD facility development project in the Philippines. In this structure, the government takes the risks of TSD facility development itself and relevant loan repayment while the private partner will cover the risk of TSD facility operation. Since the private sector proponents cannot take all the above risks in the present HWM conditions in the Philippines, the government takes the former risks to promote private sector participation in TSD operation business.

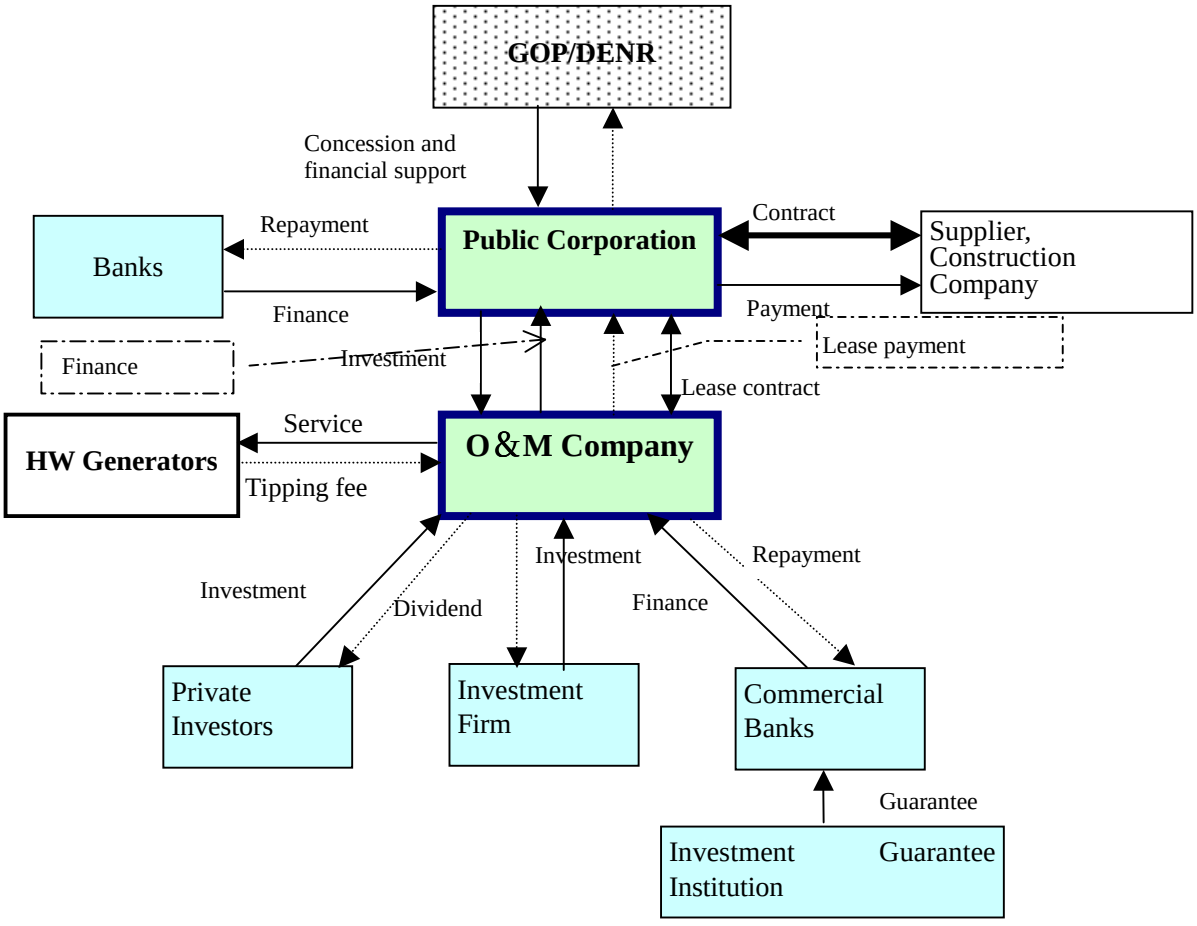


Figure8.5.1 The Structure of the Model TSD Facility Development Project

Under this project structure, the government has to make an effort in enforcing the laws and regulations on HWM so as to minimize the risks of TSD facility construction and loan repayment, which results in mitigating the risk of TSD operation by the

private partner. On the other hand, the private partner will jointly hold the risks under the lease contract of the TSD facility with the government since he is obliged to pay the lease fees from the income of the TSD facility operation. If this project structure works successfully in a economically feasible manner, private sector will be able to take the all the risks of TSD facility development and operation with the indirect government interventions.

Moreover, this project structure does not need any subsidy by the government since the public capital investment will be recovered by the TSD operations by the private partner under the contract between the Public Corporation and the O & M Company in the figure above.

As the long term loans from the commercial banks by the O & M Company, which is indicated in the figure above, may be difficult in the case of the Philippines due to no security of the project itself as well as the guarantee by the relevant project bodies, it is necessary to invite as much as possible the foreign capital investment in the project.

Although the Public Corporation in the Figure 8.5.1 is considered to be NRDC or LLDA, both of them do not have any experience in constructing TSD facilities. Their financial capacity must be duly investigated.

In addition, since there is no private O & M company having enough experience in TSD facility operation, involvement of the experienced foreign firms will be needed to properly operate TSD.

9. PROPER HWM AT SOURCES AND PROMOTION OF 3 R (REDUCE, REUSE, AND RECYCLE)

The basic principle of HWM in the Philippines is that HW generator holds the primary responsibility for proper management of HW. HW generator has the obligation to properly store or treat HW on-site or off-site in compliance with the laws and regulations concerned.

To accomplish his duties, HW generator has to well understand the legal and regulatory system of HWM in the Philippines and completely follow them by his internal HWM system to be established.

The regulating authority is required to encourage and guide HW generator in his effort of proper HWM. Mentioned below are the policies and measures to promote these efforts of HW generators.

9.1 Targets of Proper HWM at Sources and Promotion of 3 R

The master plan set the following targets for proper HWM at sources and promotion of 3 R in the Philippines:

Targets
- **To increase the number of registered HW Generators**
- **To establish proper HWM at sources by 2004**
- **To establish in-house HWM system by HW generators**

9.2 Compliance with Registration and Reporting Obligations

9.2.1 Increasing HW Generators' Registration

The master plan set up the following sub-targets of increasing the number of HW registered generators.

Sub-Targets:
- **To increase the number of registered HW generators from the current 1,079 to 6,500 by the average annual additional registration of 400 generators.**
- **To register every new enterprise generating HW.**

Table 9.2.1 Targeted Number of Registered HW Generators by Scale of Industries

Scale of industries (No. of employees)	Under 10 employees	Under 50 employees	Under 200 employees	Under 1000 employees	Over 1000 employees
Coverage of Generators	0.1%	1.1%	6.1%	15.6%	43.0%
% of Potential Generators (# of Generators)	1% (1,315)	10% (1,584)	60% (2,064)	100% (1,262)	100% (158)

9.2.2 Compliance with Reporting Obligation

The obligation of quarterly reporting on HW generation is only followed by about 20 % of the registered HW generators. It should be increased to 100% at the earliest possible.

9.3 Promotion of 3 R

9.3.1 Policy Targets

(1) HW Minimization (Reduction)

The keys of HW minimization at sources exist in conversion of raw materials to non-hazardous or less hazardous materials and improvement of production process to lower HW generation. These efforts should be promoted as a top priority.

(2) Reuse and Recycling

The Study Team suggests promoting recycling of the following key HWs at sources.

- Waste oil
- Waste solvents
- Acid and alkali wastes
- Heavy metal sludge, soot and dust

9.3.2 Policy Measures

(1) HW Minimization (Reduction)

In cooperation with the international organizations such as UNIDO, the regulating authority should promote cleaner production technologies (CP) to the HW generators by providing information and also raising their awareness.

Table 9.3.1 Policies Measures to Promote HW Minimization

2001-2002	2003-2004
・Accumulate relevant information about CP, identify policy issues to promote CP, and formulate the national CP promotion plan. ・Awareness raising of CP	・Implementation of the plan through the involvement of the relevant industries generating HWs.

(2) Reuse and Recycling

The government will take the following measures to promote HW recycling.

Table 9.3.2 Policy Measures to Promote HW Reuse and Recycling

2001-2002	2003-2004
・Identify issues to be solved for promoting HW recycling by types of waste. ・Prepare the guidelines for promoting HW recycling ・Establish economic incentives. ・Deregulation	・Promote and expand on-site recycling. ・Expand recycling business by private sector. ・Study the possibility of storing the HWs to be reused or recycled in the future.

9.4 Promotion of Proper HWM at Sources

To promote proper HWM at sources, the regulating authority will encourage HW generators to take the following actions:

9.4.1 Development of On-Site TSD Facilities

(1) Development of on-site HW treatment facilities
(2) Development of on-site HW storage facilities
(3) Notification and permits of on-site TSD facilities
(4) Reporting obligations of on-site HW storage

9.4.2 Proper Contract with TSD Operators

9.4.3 Implementation of the Waste Tracking System (WTS)

9.5 Establishment of In-House HWM System by HW Generators

The regulating authority will take the following policies and measures to promote establishment of in-house HWM system by HW generators.

(1) Institutionalization of the Appointment of In-House HW Managers

(2) Promoting the Certification of ISO 14001 and Establishment of In-House HW Management System

9.6 Awareness Raising

(1) Disseminating Information on HWM

(2) Training Seminars and Workshops

(3) Information and Opinion Exchange Between Regulating Authority and Regulated Communities

To increase awareness and understanding of HWM, the regulating authority has to properly provide information to HWM stakeholders and also the public. The information to be provided with by each stakeholder is given in Table 9.6.1 below.

Table 9.6.1 Information to Be Provided to Each Stakeholder

	Information
Generators	・Details of the laws and regulations, including RA6969 and DAO92-29. ・Waste prevention and CP technology ・Economic incentives for environmental investments. ・Activities of HW treaters. ・In-house HW management system, and acquisition of ISO 14001 certification.
HW Treaters	・Details of the laws and regulations, including RA6969 and DAO92-29. ・Economic incentives for environmental investments. ・In-house HW management system, and acquisition of ISO 14001 certificate.
Public	・Needs of proper HWM and outline of legal and regulatory system ・Current status of HW management in the rest of the world.

10. STRENGTHENING OF LAW ENFORCEMENT AND ADMINISTRATION ON HWM

This chapter deals with the following topics relating to the strengthening of law enforcement and administration on HWM.

- Preparation of laws, regulations, and rules.
- Development of information management system.
- Monitoring and inspection on HWM according to the plans.
- Capacity building and human resource development.
- Strengthening financial capability.

10.1 Measures to Strengthen Law Enforcement on HWM

10.1.1 Basic Strategy

The principal keys of proper HWM in the Philippines are enactment of sufficient laws and their supporting rules and regulations, as well as the establishment of strengthened institution and human resource to enforce them.

The first step of strengthening the above-mentioned capacity is to accumulate visible achievement with a step-by-step manner. Quantifiable targets may be necessary to be easily understood by each staff member of the regulating authority. The Study Team set up the phased targets as given in Table 10.1.1.

Table 10.1.1 Phased Targets of Strengthened HWM Capacity

2001-2002	2003-2004
・Develop necessary regulation, standards, and manuals. ・Capacity building	・Enforcement of the established regulation, standards, and manuals.

10.1.2 Review and Reinforcement of Laws and Regulations

(1) Rules and Regulations related to RA6969, DAO92-29

RA6969 was enacted in 1990 as the basic law for HWM and DAO92-29 was issued in 1992 as the implementing rules and regulations of RA6969. Although, it has already been 10 years since the issuance of DAO92-29, there are still a lot of legal and regulatory issues to be addressed for proper enforcement these laws and regulations.

Among others, the issues of great importance to be addressed are preparation of the standards and criteria relating to HWM, which include the following:

a) HW Treatment and Disposal Standards
b) Technological Requirement for TSD Facilities and their Operations
c) Criteria for Permitting HW Haulage
d) Reporting Requirement regarding the Operation Record Keeping of TSD Facilities
e) Criteria for Permitting HW Treatment

(2) Other Complementary Rules and Regulations

a) TSD Facilities and HW Transport Permits
b) Introduction of In-House HW Managers at Sources (Generators)
c) An Official Notice of Temporary Storage of HW
d) Preparation of Guidelines and Manuals

10.2 Information and Data Management System

The information and data to be managed in HWM include registration of HW generators and treaters, their reports and notifications, and relevant permits. All of them should be controlled through an electronic database at the earliest possible. One important issue here is to update these data and information in regular bases. Capacity building should also be made in these aspects.

Table 10.2.1 shows the results of assessing available data and information on HWM in the regulating authorities.

Table 10.2.1

Present Information and Data Availability and Assessment of the Future Needs

	Policy Items	Information Management	Current Level
EMB Central Office	• Planning measures on Treatment/ recycling	• National information on sources of waste generation.	B
		• TSD facility management	C
	• Source control	• National information on sources of waste generation	B
	• Treaters	• National information on treaters	C
	• Status of monitoring	• Local monitoring plans and their reports.	D
	• Inappropriate treatment practice	• Instances of inappropriate treatment at local level.	D
	• Informative assistance	• Generating source, HW, and technical information	D
	• TSD facility permit	• Relevant information	D
EMB Regioal Office	• Source control	• Manage information on HW registration	B
		• Quarterly reports	C
		• Manifest information	D
	• Treater management	• HW registration information	D
		• Quarterly reports	D
		• Manifest information	D
	• Monitoring implementation	• On-the-spot inspection at source.	D
		• On-the-spot inspection of the treaters.	D
		• Illegal dump sites	D
	• IEC activities	• Seminar participants	D
	• TSD facility permit	• Relevant information	D
	• Improvement order, notice of violation	• Information of the targeted businesses	D

Remark: A: Excellent B: Good C: Moderate D: To be Improved

10.3 Monitoring and Inspection

10.3.1 Development of HWM Monitoring and Inspection System

(1) Target and Strategy for Target Compliance

Target:

- **Strengthen the present institution and capacity of available human resource up until 2003.**
- **Start full-fledged HWM monitoring and inspection in 2004**

(2) Strategy for Target Compliance

The regulating authority will formulate the national HW monitoring and inspection plan. The plan will include regional target number of facilities to be monitored and inspected. It will also provide criteria for selecting priority HWs and sources subject to monitoring and inspection. Based on this plan, regional regulating authority will formulate its own monitoring and inspection plan. Region-by-region achievement of HW monitoring and inspection will be annually evaluated by the central regulating authority.

(3) Monitoring/Inspection Subjects

Monitoring and inspection subjects may include:

- ✓ Compliance with the registration duty,
- ✓ Compliance with the reporting duty,
- ✓ Safekeeping of manifest sheets,
- ✓ Proper storage of non-recyclable/non-treatable HW on site,
- ✓ Separate management of HW by categories,
- ✓ Proper consignment to the HW haulers and treaters,
- ✓ Establishment of in-house HWM system
- ✓ Conditions of in- house rules, manuals, and training on HWM,
- ✓ Proper categorization of HW,
- ✓ Exact and true record-keeping and reporting to the regulation authority,
- ✓ Proper treatment and disposal of HW

(3) Expansion of Registered HW Generators

The master plan set up the target to increase the number of registered HW generators to 5000 by 2010. As the first step, the regulating authority has to identify priority industries on the basis of available HW generators' information. Subsequently, non-registered enterprises of corresponding industries are inspected to confirm their generation or no generation of HW. The identified non-registered HW generators will enter the procedure for registration one after another.

The regulating authority will take the following steps to achieve the established targets.

a) Capacity Building of the Existing Human Resources (2001-2002)
b) Implementation of Preliminary (Pilot) Surveys on Potential HW Generators (2002-2003)
c) Full-Scale Implementation of the Surveys (2003-2010)

Based on the possible increase of human resources and their training probably in 2003,

regional offices will start full-scale surveys in 2004. Average number of potential HW generators surveyed will be set at 200 to 300 per annum.

(4) Monitoring and Inspection according to the Prepared Implementation Plan

A. Selection of Priority HWs

Monitoring and inspection priority should be given to the HWs having large and serious impacts on human health and environment. Especially, the danger to human health is of great importance. In this respect, priority HWs may include some of hazardous inorganic chemical substances and organic wastes of high toxicity, such as chlorine solvents, PCBs, infectious waste, asbestos, and so forth.

B. Selection of Priority Industries

Priority industries will be determined by screening the generators of priority HWs with some criteria, for example, those who generate more than 10 tons of priority HWs per year.

All of the TSD facilities (including on-site ones) will also be subject to on-site inspection.

C. Monitoring and Inspection Details

Monitoring and inspection will be carried out on the subjects given above (see (3) of Section 10.3.1). The regulating authority may require generators to analyze tests on some HWs to assess their toxicity. Maybe some of the sample will be taken for analysis in the labs of the regulating authority.

As to TSD facilities, the following items needs to be thoroughly inspected.

- Landfill operations,
- Handling of treatment residue,
- Treatment and landfill operation records.

D. Frequency of Monitoring and Inspection

On-site inspection will be conducted once per 1 or 2 years on the priority generators. As to TSD facilities, the regulating authority will conduct on-site inspection once or twice a year.

E. Phased Development of Monitoring and Inspection

Monitoring and inspection on HW generators and TSD facilities will be developed by taking the following steps:

a. Selection of Priority Generators and Facilities (2001-2003)
b. Formulation of the National Monitoring and Inspection Plan (2001-2003)
c. Full-Scale Implementation of Monitoring and Inspection (2004-2010)

(5) Inspection on Illegal Damping Sites and Municipal Waste Landfills

The regulating authority will conduct patrolling of illegal dumping sites and municipal waste landfills to control improper HWM. The regulating authority will set up a window to receive reports from the peoples. If illegal dumping of HW is identified, the regulating authority, in cooperation with the police department as far as it is possible, will conduct detail investigation.

(6) Analysis and Screening of HW

First priority will be given to the establishment of the criteria for determining toxicity of HWs and standardization of analyzing methods. All of them have to be completed at the earliest possible in 2001. HW analysis guidance to the generators will also be carried out to promote self-analysis.

10.3.2 Establishment of Waste Tracking System (WTS)

The master plan establishes the target to realize WTS in the Philippines by 2010. The actions to be taken to achieve this target are as follows.

- ✓ Establishment of the manifest sheet distribution system,
- ✓ Dissemination of WTS to HW generators, haulers, and treaters,
- ✓ Inspection on the compliance with WTS participation.

Cross-examination of the submitted manifest sheets between those submitted from the generators and TSD operators will be a complicated and difficult process if it is manually conducted by exchanging manifest sheets. Therefore, the master plan recommends establishing an electronic waste tracking system.

10.4 Institution and Capacity Building of HWM Administration

To implement the plans and measures provided in this chapter, the Philippines HWM administration has to be strengthened in all its aspects, including organizational, human resource, and financial capacities. The financial capacity is always the key to strengthening all other capacities of HWM administration. Taking into account the current tight budget constraint and conflicting policy priorities, however, capacity building of existing human resource and other available resources should be focused at this moment. Further strengthening of the capacity will be carried out with the expansion of administrative roles of the regulating authority of HWM.

(1) Roles of the Regulating Authority in HWM

Comparing with the required roles in HWM, capacity of the regulating authority is definitely unlimited in all respects (human resource, equipment, and budget). Increased allocation of budget is of particular importance in proper HWM administration.

The roles of regulating authority in HWM include:

- Supervising HWM of generators (generation, storage, treatment, disposal),
- Supervising HW haulers and TSD facilities operations,
- Managing information of registered generators, haulers, and treaters,
- Management operation of the Waste Tracking System,
- Issuance of permissions (TSD facilities, HW transport, etc.) and ECCs,
- Administrative guidance to HW generators, haulers, and treaters,
- Awareness raising of HW generators, haulers, and treaters,
- Strict law enforcement on HWM, especially against violators,
- Preparation of supporting manuals and guidelines for HWM,
- Providing relevant information to HWM stakeholders

(2) Reorganization and strengthening of national and regional regulating authorities on HWM,

A. Reallocation of Tasks Between National and Regional Regulating Authorities

The roles and required expertise of national and regional regulating authority are given in Table 10.4.1.

Table 10.4.1

Required Roles and Expertise of National and Regional Regulating Authorities

	Duties	Sections	Personnel
National Office	-Development of legislation, regulation, and manuals.	-Laws and regulations	-Lawyer (1)
	-Policy making & Planning -Evaluating treatment status	-Policy, planning, and management section	-Engineer (1) -Lawyer (1)
	-Technical manuals -Technical assistance -Permit approvals -Import-export control	-Technical control section	-Chemical engineers (2) -Engineer (1)
	-Information management -Manifest management -Information offering	-Information management section	-System Engineer (1) -Engineers (2)
	-Waste analysis (tentative)	-Waste analysis section	-Chemist (1)
Regional Office	-HW registration, reports -Receiving manifests	-Management section	-Engineer
	-Monitoring, patrolling, and sampling -Permits	-Monitoring section	-Chemical engineer -Engineer

B. Cooperation with the Affiliated Organizations

It may be difficult for national and regional EMBs to handle all the works defined in this chapter. The use of the existing affiliated organizations has to be maximized to ease their tasks. Establishment of public-service corporations will be an option to take over some tasks, such as management of the Waste Tracking System, analysis of HWs, and so forth.

C. Institution Building

Figure 10.4.1 below shows the recommended organizational scheme for HWM in the Philippines.

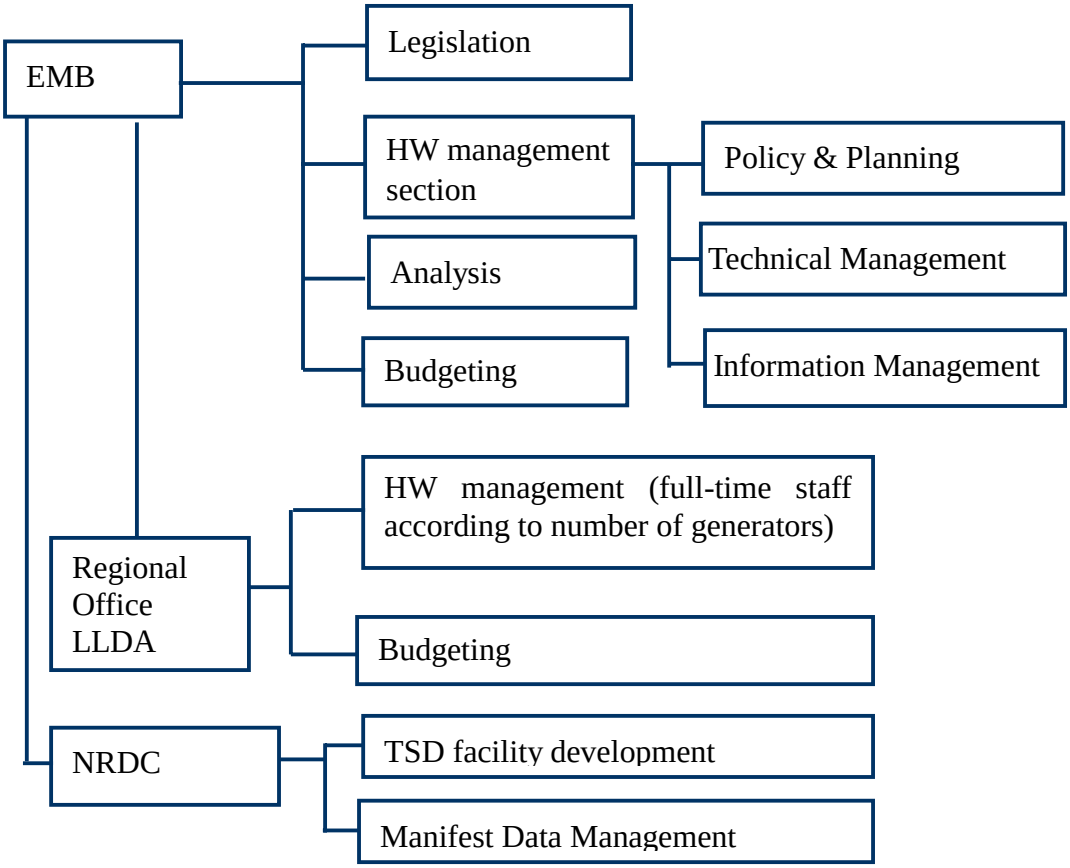


Figure 10.4.1 Recommended Organizational Scheme of HWM

Meanwhile, Table 10.4.2 below specifies the tasks of each section.

Table 10.4.2 Allocation of Tasks by Each HWM Section

Branch/ Section			Responsibilities
Inter-Agency Technical Advisory Council			- Council on National Plan on HW Management and Development Plan - Prepare policy and regulation
EMB	Legislation		- Revise RARA6969 and DAO92－29 - Prepare legislation and regulation - Prepare Official Notice on the regulation
	HW management Section		
		Policy & Planning	- Develop a National Plan on HW Management - Propose policy on HW - Evaluate status of HW management - Prepare a report to the Secretary - Conduct relevant study
		Technical Management	- Develop technical guidelines - Technical audit on TSD facilities - Give technical advise - Manage export and import - Train person concerned
		Information Management	- HW registration information, management on quarterly report - Information on waste treaters - P.R. & promotion
	Analysis		- Standardize analytical methods on waste - Perform waste analysis
	Budgeting		- Fees on HW registration and the manifest - Budgeting on waste tax
Regional Office	HW Management		- HW registration, Manifest - Monitoring
	Budgeting		- Fee collection on HW registration and manifest
NRDC	Facility Development		- Prepare a plan on facility development - Participate in private sector project - Training for the generators and treaters
	Manifest Information		- Sell manifest - Manage data from the manifest

(3) Capacity Building of Existing Human Resource

Targets:

To increase the capacity of existing human resources in the national and regional EMBs as the core members of HWM in the Philippines

Human resources are the most important keys to realization of proper HWM in the Philippines. Not only the human resources in regulating authorities, but also those in the regulated communities has to increase their capacity of HWM. Superior human resources in the regulated communities will mitigate the burdens of the regulating

authorities in HWM.

Capacity building of the central EMB will be given the first priority because proper HWM should start from this bureau. Subsequently, the capacity of regional offices will be raised, followed by human resources in the regulated communities.

Capacity building of the central regulating authority (DENR/EMB) will be first carried out. Subsequently, DENR/EMB will conduct technical transfer to regional offices.

Some of the training programs are also useful for HW generators and treaters. The regulating authority should conduct the above training also to generators and treaters.

(4) Increase in Human Resources

A. Monitoring and Inspection Staff

The government will not accept request of additional staff members unless its reasons are theoretically understood on the basis of actual administrative achievement of the regulating authority. Therefore, the first action to be taken is to increase the administrative performance of the existing human resources in the visually identifiable way. In the case of monitoring and inspection, number of inspected generators can be used as a performance indicator. Based on the accumulation of this kind of data, needs of additional staff members can be reasonably understood by the government.

Additional staff members for the HWM Section are needed to implement RA6969.

B. HW Laboratory Staff

Due to limited budget and human resources, it is not possible to conduct HW analysis sufficiently in the Philippines at this moment. However, the regulating authority should at least set the target, for example, of 10 % increase by 2010. It also needs to improve technical capability of the laboratory staff.

10.5 Strengthening of Financial Capacity

Targets:
To increase both development and operational budgets for HWM

Financial capacity of the regulating authority has to be strengthened in terms of development as well as operational budgets. Development budgets, in this case may

include new facilities and equipment for HWM, such as HW waste analyzing labs and their equipment, data management and waste tracking systems, and so forth, while operational budget may cover manpower and other regular operation costs of HWM by the regulating authority. In principle, both budgets are necessary to be allocated by the Government of the Philippines. However, some of the above costs can be charged to the regulated communities of HWM. The central EMB currently collects fees for registration of HW generators, issuance of various permits, ECCs, and so forth. The operation cost of Waste Tracking System is an example to be covered by the fees charged to the users of manifests. The cost of HW analysis should also be covered by the fees charged to the generators. It is also another option to introduce HW taxation system, which is widely applied in European countries. The regulating authority has to duly examine the possibility of all these measures in terms of legal and policy aspects so as to increase its financial capacity. It is also necessary to build a proper and transparent budget allocation and control and accounting system to properly manage the fund for HWM.

The principal constraint in strengthening the capacity of HWM administration in the Philippines is the financial limitation. Any of new HWM administration work creates some costs to be covered. The regulating authority may have to consider the possible sources of fund in addition to government budget allocation. The operation cost of registration and WTS may be covered by charging the fees to the user of the system. The other option is the introduction of taxation on HW, which is widely applied in European countries. The collected taxes are usually used for HWM purposes in these countries.