



# TOXIC AND HAZARDOUS WASTE MANAGEMENT TRAINING GUIDE



September 2005



**USAID**  
FROM THE AMERICAN PEOPLE



This project is implemented by Development Alternatives, Inc. with the support of its subcontractors:

- Orient Integrated Development Consultants, Inc.
- Resources, Environment and Economics Center for Studies, Inc.
- Winrock International
- Abt Associates, Inc.
- Management Systems International
- Michigan State University

*This document was completed through the assistance of the United States Agency for International Development (USAID) Mission to the Philippines under Contract Number 492-C-00-04-00037-00. The views expressed and opinions contained in this publication are those of the authors and are not intended as statements of policy of USAID or the authors' parent organization.*

## Table of Contents

Introduction to the Training Guide .....	1
Project Background and Situational Analysis .....	2
Part 1. Environmental Governance and Coastal Resources Management .....	4
Part 2. Toxic and Hazardous Waste Management Process .....	19
Part 3. THW Situational Analysis and Assessment .....	27
Part 4. Key Elements of an LGU THW Management Plan .....	35
Part 5. LGU Actions Planning .....	64



# Introduction to the Training Guide

**T**he toxic and hazardous waste management (THWM) guide is a synthesis of the training materials used by the Philippine Environmental Governance (EcoGov) 2 project in assisting local government units (LGUs) toxic and hazardous waste planning and the integration of the plan into the Integrated Solid Waste Management Plans of the LGUs. The Guide provides a description of the training and mentoring approaches of the EcoGov 2 as the Project aided the LGUs in the formulation of their THWM plans. This document could be used as a guide to further capacitate LGUs with legitimized plans by incorporating the THWM component. It could likewise be used as a guide for target LGUs to incorporate THWM upfront in the formulation of their ISWM plans.

This Guide is intended for local service providers (LSPs)\* organizers, trainers and facilitators, tasked to assist Municipal and City LGUs in preparing and implementing governance enhanced THWM plans. It serves as reference to enhance their understanding of the EcoGov technical assistance approach, to help them develop THWM training programs for LGUs and to allow them to use EcoGov developed analytical and decision-making tools that promote the practice of transparency, accountability, and participatory decision making (TAP).

This training guide has 5 major parts:

- Part 1: Introduction and THW Overview
- Part 2: THW management in SWM
- Part 3: Assessment of THW management practices
- Part 4: Key Elements of a LGU THW Management Plan
- Part 5: Workshop: Defining LGU Options and Next Steps

Each part is described in terms of coverage, objectives, expected output, duration, as well as methodology/ approach, timeframe and participants. It should be noted that the module does not include only the formal or classroom type training activity, but also some hands-on activities and exercises. This way, the participants get to apply newly acquired knowledge and/or skills while doing on the job training or while implementing the LGU action plan.

To ensure that training participants will get an appreciation of the concepts, policies, processes and tools relevant to the module, the Guide includes a substantial portion on the technical component. Recommended topics or inputs are provided in the lecture notes, discussion guides, and references that are found at the end of each part.

In addition, the Guide provides a set of annexes for each part, which contains the exercises, guidelines, source books, templates, examples and case studies that have been developed by the EcoGov 2 team. This training guide on THWM is meant to be supplemental to the previous ISWM training guide developed by the EcoGov 1 team.

---

\*The service providers referred to here include DENR field offices, EMB, DOH Centers for Health Development, provincial governments, non-government organizations, consulting firms, academic institutions and individual professionals

# Project Background and Situational Analysis

**T**he Philippine Environmental Governance (EcoGov) Project is a technical assistance grant from the United States Agency for International Development (USAID) to the Government of the Philippines (GOP). EcoGov supports GOP's and USAID's goal of revitalizing the economy by promoting better environmental governance, stimulating economic growth, and increasing food security. As part of USAID's overall program on environmental governance, EcoGov addresses the need for improving solid waste management services at the LGU level. It is believed that technical solutions alone may not be enough to overcome these challenges; ensuring that good governance is part of environmental management options may be the key in effectively addressing these issues.

In EcoGov 1, the project provided technical assistance to local government units (LGUs) to improve on their governance and to help them comply with the requirements of the Ecological Solid Waste Management Act (RA 9003). LGU capacities were developed in the areas of waste assessment and characterization, formulation of a 10 year Ecological Solid Waste Management (ESWM) plan, diversion of wastes away from the disposal, implementation of waste reduction, recycling and reuse at source and offsite, as well as preparation for sanitary landfill disposal of residual wastes.

EcoGov 2 Urban Environment Management (UEM) Sector will continue to assist LGUs in the completion and implementation of their respective Integrated Solid Waste Management (ISWM) plans targeting 90 LGUs for 2005-2010, to include the management of toxic and hazardous waste (THW). Including proper THW management in the ESWM process can contribute to the objective of diverting 25% of waste through recycling and composting, since according to the World Health Organization, THW generating institutions such as health care facilities generate only 20% hazardous waste and 80% general or domestic waste, the waste fraction which has potential for recycling and composting. This is also in support of the Philippine Medium Term Development Plan thrust on the creation of a healthier environment for the population by establishing a management system and facilities for THW in the country. As in EcoGov 1, ensuring good governance as part of Environmental management options, aside from the technical input, will be the key to effectively address UEM issues, to include THW.

Waste characterization activities in 14 EcoGov-assisted Local Government Units (LGUs) with legitimized ISWM plans showed that "special waste," which includes toxic and hazardous wastes (THW), came from three major sources: households, industries, and health care facilities. Major industry sources are gasoline stations, motor shops, vehicle repair shops and machine shops. There were some LGUs which reported to have an electric company warehouse, glass suppliers, and a large semiconductor industry. Among health care facilities, the major sources of THW were district hospitals, rural health units, barangay health stations, medical/dental clinics, drugstores and funeral parlors. End-of-pipe or waste disposal assessments revealed that special wastes or THW were mixed with general waste and were indiscriminately disposed in open dumps.

EcoGov data likewise showed that the THW generated in LGUs ranged from 0.57% to 4.98% of total waste generated within their collection area. \* (**Annex 1: A Review and Analysis of Waste Characterization**

---

\* The "special wastes" referred to here are those which generators generate and dispose off-site, specifically into open dumpsites or other common disposal sites. These special wastes were identified and measured during the seven-day waste characterization exercises held in the EcoGov-assisted LGUs. They do not include pathological waste, infectious waste and other hazardous waste that health care facilities and industries store or dispose in their on-site disposal facilities.

**Results on “Special Waste “ conducted in 2003 by 14 Local Government Units with Legitimized Ecological Solid Waste Management Plans, Philippine Environmental Governance Project 1).**

This finding is consistent with a National Solid Waste Management Commission (NSWMC) report which states that in 2004, “special waste” only comprised 0.6 % of the total waste in LGUs. These figures indicate that a small amount of THW is generated by LGUs. However, it must be recognized that, though minimal in terms of volume, THW could pose a serious threat to public health and the environment when not managed properly. Management of THW is thus an important public health issue since it involves major risks for the health of the people and the environment. It must therefore be addressed by LGUs.

As part of EcoGov 2 technical assistance package, capacity building on THW management will be provided to target LGUs so that they can undertake actions consistent with their mandates. For example: the LGU has regulatory and monitoring role over the THW management plan implementation of waste generators and waste treaters. The EcoGov 2 technical assistance will provide them with options in the following areas: policy formulation, information, education, and awareness campaign, engineering options, investments, and for establishing organizational/institutional arrangements for multi-agency collaboration.

# Part 1

## Environmental Governance and Coastal Resources Management

**T**his part will start with a review of Environmental Governance and its principles of transparency, accountability, and participatory decision-making (TAP), and how these relate to EcoGov 1 ESWM experience. A discussion of ISWM major issues will follow along with how the TAP principles enhance decision-making. Governance challenges in managing THW as well as the 6 challenges to respond and impact on the future of LGU ISWM will likewise be discussed.

A **lecture** on the basics of THW will be done, to include THW definition, sources, and properties. These will be contextualized in the local setting, citing concrete examples which are familiar to the participants. Health and environmental impact of THW will be emphasized, citing concrete experiences of diseases and environmental disasters brought about by inappropriate THW management. The discussion will lead to the objectives of the THW management component as an integral component of ISWM.

Policies and legislations (both international commitments and national laws) including prohibited acts will be discussed in order to serve as framework and for the participants to relate to LGU mandate. There will be role clarification of the LGUs relative to national legislations. In the Ecological Solid Waste Management Act, the City/Municipality is expected to handle the collection and disposal of THW from household sources. In the Toxic Substances Hazardous Nuclear Waste Control Act, the Environment Management Bureau directly regulates waste generators and waste treaters. Likewise, the Local Government Code stipulates that the LGU is expected to regulate disposal of health care waste. The LGU therefore has both regulatory and monitoring role over waste generators and waste treaters.

This introductory part may also be used in interactive assemblies conducted by the Project with LGUs interested of availing of EcoGov 2 technical assistance as a component of solid and liquid waste management. This part may be used in briefings with the TWG and the ESWM board of the LGU, provincial governments, DENR and LSPs to review on how the TAP principles facilitated the approval of the ISWM plans, as well as the current governance challenges in ISWM.

### Expected Output of Part 1

Part 1 will give the participants a review of Environmental Governance principles and challenges as well as an overview and basic knowledge of THW definition, sources, properties, its health and environmental impact and its legal and policy framework.

### Participants

The participants are the City/Municipal health, budget and planning officers, CENRO/MENRO, Provincial health and environment officers, Provincial sanitary engineers, Regional DENR/ EMB, and Sangguniang Bayan or Sangguniang Panglungsod Chair of the Environment committee. If used to orient TWGs and ESWM boards, the participants may include local chief executives, DOH representative and other members of the Local or Municipal/City Health Boards and all other members of the TWG and ESWM boards.

## Time frame

The orientation session will cover one half day.

## References for Part 1 Lecture Notes

Occupational Toxicology Manual. UP National Poison Control Service and NCDSCS DOH, Manila, Philippines, 1998.

Philippine Ecological Solid Waste Management Act of 2000 (RA 9003)

Philippine Toxic Substances Hazardous and Nuclear Waste Act of 1991 (RA 6969)

Philippine Clean Air Act of 1999 (RA 8749)

Philippine Clean Water Act of 2004 (RA 4275)

Philippine Hospital Licensure Act of 1981 (RA 4226)

Philippine Local Government Code of 1991 (RA 7160) and their respective IRRs

United States Environmental Protection Agency, <http://www.epa.gov>

United Nations Environment Program on Chemicals, <http://www.chem.unep.ch/>

US Department of Health and Human Services, Agency for Toxic Substances

And Disease Registry, <http://www.atsdr.cdc.gov>

## ***Lecture Notes***

### **A. Governance Challenges in Managing THW**

#### ***Six Challenges to Respond and Impact on the Future of LGU ISWM***

**Challenge 1:** Adopting the “system of good governance coordinates in all decisions and actions regardless of local interests”

- ◆ **Transparent, accountable, participatory, and responsive processes** are leading to right decisions and actions
- ◆ Decisions and actions are based on solid ground – **accurate, science-based, and validated** information with stakeholders
- ◆ Decisions and actions are consistent with **policies, strategic direction**, compliance to requirement, and meeting target results
- ◆ **Enforcement and social justice** are served and **rule of law** prevails

**Challenge 2:** Anchoring governance decisions and actions on policies

- ◆ RA 9003 and its IRR, and local ordinances
- ◆ Resolutions expressing consensus and agreements by stakeholders
- ◆ Ordinance legitimizing and approving ISWM plans
- ◆ Ordinance creating RAAs that will use their 5 senses during implementation – vision, mission, anticipation, urgency, and common sense

**Challenge 3:** 11 Key decisions and action areas

LGUs: Responsible, accountable and authorized centers

- ◆ Who at the LGU levels will be Responsible, Accountable, and Authorized (RAA)?
- ◆ What will the RAA centers do and how will they be empowered and mobilized?
- ◆ Where and what to collect, transport and dispose?

**Challenge 4:** LGU response in a holistic, responsive, and coordinated way

- ◆ What biological, social, financial, political, institutional, and physical factors do we have to deal and integrate during the implementation phase?

**Challenge 5:** Translating strategies into actions and empowering implementation units to carry out initiatives to ensure safe public health and environment

- ◆ Enacting ordinances at the barangay, municipality, and provincial levels – budget, staff, enforcement, incentives
- ◆ Matching operations, penalties, and social marketing to achieve composting targets from residential, public market, general store areas
- ◆ Choosing appropriate technologies, facilities and equipment
- ◆ Securing the right mix of financing and mode of procurement
- ◆ Hiring, compensating, and capacitating implementing staff
- ◆ Establishing collaborations to multiply local capacities

**Challenge 6:** Developing and implementing LGU THWM—So that,

- ◆ ISWM condition will be similar today or better
- ◆ ISWM will be much better than today
- ◆ ISWM will be similar to today but not worse
- ◆ ISWM will be radically different from today for the better

## B. Fundamentals of THW

### B. 1. Definition,, Properties, Sources,Impact, Types

A hazardous substance is a substance discarded from homes, commercial, industrial establishments, institutions and healthcare facilities.

- ◆ Can be solid, liquid or gas that may affect human health and environment when not managed or handled properly.
- ◆ Can cause injury, disease, economic loss, or environmental damage.
- ◆ Can be fatal to humans at low doses, form: physical, chemical or biological. A systematic administration of activities that provide for – identification, listing, collection, segregation, storage, transport, recovery, reuse, processing, reprocessing, treatment, disposal of hazardous waste.

#### ROUTES OF EXPOSURE

Inhalation

Digestion

Direct contact – skin, eyes

Toxicity= Dose X Duration of Exposure

### THW Properties

- ◆ toxicity - contain substances that are poisonous
- ◆ Persistence – stay long and travel long distances (e.g. organochlorines, PCBs, HCBs, dioxins, furans)
- ◆ Reactivity - able to explode (e.g. peroxide, hypochlorite, formaldehyde)
- ◆ Degradability in nature – may resist photolytic, chemical, and biological degradation ( e.g. heavy metals)
- ◆ Potential for accumulation in tissue – soluble in fatty tissue of living organisms and bio magnify as they move up the food chain (e.g. pesticides)
- ◆ Ignitability – capable of burning (e.g. waste oil, used solvents, paint)
- ◆ Corrosivity – able to corrode steel (e.g. acids from metal cleaning, oxidizing agents such as ozone, hydrogen peroxide)
- ◆ Carcinogenicity – cause cancer (e.g. lead, mercury, arsenic, dioxin, anti-cancer drugs)
- ◆ Mutagenicity – cause mutations in chromosomes ( e.g.pesticides, aflatoxin)
- ◆ Teratogenicity – cause birth defects ( e.g.mercury, lead, cadmium, PCBs)
- ◆ Infectious – cause disease (e.g. healthcare waste)

### Sources

- ◆ household (e.g. batteries, paints, bulbs, solvents, used motor oil)
- ◆ industries (e.g. petroleum refineries, factories, smelters, mining, paper pulp, glass ceramics, coal mining, iron and steel)
- ◆ agriculture (e.g. pesticides, fertilizers)
- ◆ health care facilities(e.g. hospitals, health centers, clinics, laboratories, mortuaries, blood banks, research institutions, medical and nursing schools, dialysis centers,etc.)

### Impact of THW

THW is special in that it has a higher potential for injury and infection than any other types of waste. Therefore, they are to be handled with sound and safe methods. Inadequate handling of THW may have serious public health consequences and adverse impacts on the environment. THW management is, therefore, an important and necessary component of environmental health protection.

### Health effects of THW

THW when improperly handled can lead to irreversible damage to the:

- ◆ Skin
- ◆ Lungs
- ◆ Heart and circulatory system (high blood pressure, blood disease)
- ◆ Liver and gastrointestinal system

- ◆ Kidneys
  - ◆ Brain and nervous system
  - ◆ Reproductive system – sterility, impotence
- National Research Council (1991) metaanalysis reports that exposure to THW in dumpsites resulted to low birth weight, headache, fatigue, neurobehavioral disorders among subjects

### **CASE STUDY: Sapang Palay**

In March 26, 2003, 53 patients from Sapang Palay District Hospital were referred to East Avenue Medical Center.

#### **Signs and Symptoms of the 53 patients were:**

- ◆ Dizziness, Headache, Vomiting, Malaise, Difficulty in breathing ,Cyanosis
- ◆ Yellowish discoloration of palms and soles

#### **Upon investigation, it was discovered that this was a case of Chemical Poisoning in Sapang Palay, San Jose Del Monte City, Bulacan**

**History** of the patients revealed inhalation of yellowish powder chemical from the dumpsite in Brgy. Citrus, San Jose del Monte;

- ◆ Unknown people dumped 25 – 40 drums in March 25, 2002
- ◆ Drums contained textile dyes with the following chemicals; phatologen (blue dye), brenthamine (red blue), acid brown, orange and fast red

This is a concrete case of chemical poisoning secondary to toxic chemicals indiscriminately dumped and scavenged , exposing 53 patients, all of whom were poisoned

Health Impact of Health Care Waste: Improper handling of the toxic and hazardous component of health care waste can lead to:

- ◆ Infectious diseases such as hepatitis B, tetanus, HIV-AIDS, gastroenteritic infections
- ◆ Respiratory infection
- ◆ Blood stream infection
- ◆ Skin infection
- ◆ Intoxication
- ◆ Cancer
- ◆ Nosocomial infection ( hospital acquired infection)

Examples of Infections caused by exposure to health care waste causative organisms and their transmission vehicles:

Type of Infection	Examples of causative organism	Transmission vehicles
Gastroenteric infection	Enterobacteria, e.g., Salmonella, Shigella, Vibrio cholera, helminthes	Feces and/or vomit
Respiratory infections	Mycobacterium tuberculosis; measles virus; Streptococcus pneumonia	Inhaled secretions; saliva
Ocular infection	Herpes virus	Eye secretions
Genital infections	Neisseria gonorrhoea; herpes virus	Genital secretions
Skin infections	Streptococcus	Pus
Anthrax	Bacillus anthracis	Skin secretions
Meningitis	Neisseria meningitidis	Cerebrospinal fluid
Acquired Immunodeficiency Syndrome (AIDS)	Human immunodeficiency virus (HIV)	Blood, sexual secretions
Septicemia	Staphylococcus	Blood
Bacteremia	Coagulase-negative Staphylococcus spp.; Staphylococcus aureus; Enterobacter, Enterococcus, Klebsiella and Streptococcus	Blood
Candidemia	Candida albicans	Blood
Viral hepatitis A	Hepatitis A virus	Feces
Viral hepatitis B and C	Hepatitis B and C viruses	Blood and body fluids

**World Health Organization reports that one needle stick injury alone has**

- ◆ 30% risk for hepatitis B
- ◆ 1.8% risk for hepatitis C
- ◆ 0.3% risk for HIV

USA: Hospital housekeeper developed staphylococcal bacteremia and endocarditis after needle injury.

**Needle Prick Injuries Among Hospital in  
Dumaguete City—→ HEPATITIS B**

**Needle Prick Injuries Among Hospital hospital Waste  
Scavengers in Payatas—→ HEPATITIS B**

### **Environmental Impact of THW**

1. **Water pollution** – contaminates ground water and other water bodies (e.g. disinfectants, pesticides, lab reagents, etc.)
2. **Air pollution** (e.g. lead, carbon monoxide, sulfur oxide, nitrogen oxide, dioxin, furan, etc.)
3. **Soil pollution** (e.g. lead, mercury, cadmium, waste disposal of sludge)
4. **Habitat destruction** of major ecosystem

### **Definition of Household THW**

Any waste, produced in the home which contains hazardous substances, which may pose a threat to human health and environment.

Common household THW sources are:

1. Batteries – contain heavy metals such as lead, mercury, cadmium
2. Paint thinners – contain toluene, xylene, acetone, naphthalene
3. Toilet bowl cleaners – contain sodium hydroxide, chlorinated phenols, chromium, ammonia, sulfuric acid, hydrochloric acid, nitric acid
4. Used motor oil – contain heavy metals
5. Household pesticides, herbicides
6. Rubber tires – contain cadmium
7. PVC plastics (floor tiles, water pipes, molded chair, tables)
8. Solvents-kerosene, diesel oil, lighter fluid
9. Bleaching agents – sodium hypochlorite
10. Fabric softeners – ammonium compounds
11. Home treatment – dialysis, insulin injection
12. Fluorescent bulbs, thermometers – contain mercury

### **Definition of Industrial Waste**

Waste discarded by factories, mines, and industries (materials extraction, processing, manufacturing service).

**Common Toxic and Hazardous Substances from Industry, Potential Health Effects, Areas in the Philippines being monitored**

Chemical	Industry	Health Effects	Phil. Areas
1. Arsenic	Mining, Smelting, Geothermal, Electronic	Dermatological: hyperkeratosis, hyper pigmentation, skin CA, Lung CA	North Cotabato
2. Lead	Petroleum, batteries, ceramic, water pipes, paint	Reduction of IQ and behavioral dysfunction, hemotologic, visual hearing impairment, neurologic, renal	Bulacan, Zamboanga
3. Mercury	Gold mining, Fluorescent, Dental fillings, Medical instrument (thermometer, sphygmomanometer)	Neurologic, Renal, Endocrine	Clark, Subic, Marinduque, Compostela, Davao, Palawan, Negros Occ, Camarines
4. Cadmium	Electro glazing, Pottery, Glaze, Fertilizers, Copper, mining	Renal effects, Osteomalacia, Osteoporosis	Toledo, Cebu, Marinduque
5. Hydrogen sulfide	Geothermal, Sewerage	CNS depressant, cardiovascular	Albay, Sorsogon
6. Organophosphate and carbamates	Agriculture	Neurologic	Cagayan, Benguet, Compostela Valley, Bohol
7. Benzene	Petroleum, Rubber, Plastics, Paints, Inks	Leukemia	
8. Asbestos	Cooling insulator, plastic	Pulmonary CA	
9. Vinyl Chloride	Plastic	CA	
10. Carbon monoxide	Petroleum, heating, boiling	Cellular anoxia, heart attach, neurology, pulmonary edema	

**Persistent Organic Pollutants (POPs)**

- ◆ Are also known as the “dirty dozen” chemicals
- ◆ persist and bioaccumulate in fatty tissues, and biomagnify in the food chain
  - √ 8 Pesticides: aldrin, chlordane, DDT, dieldrin, endrin, heptachlor, mirex and toxaphene
  - √ 2 Industrial chemicals: hexachlorobenzene (HCB) and polychlorinated biphenyls (PCBs)
  - √ 2 Unintended by-products: dioxins and furans

**Health Effects of POPs : POPs wastes can lead to**

Endocrine disruption: feminization of males, masculinization of females; Birth defects; Cancer; decreased milk production; behavioral changes; abnormal immune system (prone to infection).

### **Health Impact of Mercury (Hg) waste**

- ◆ Gold miners and workers: exposed to inorganic Hg due to direct inhalation of Hg vapor during the torching process
- ◆ People living along the river system exposed to methyl Hg through fish consumption (food chain)
- ◆ Health effects: Kidney failure, bronchitis, pneumonia, chest pain and on the effect on the Central Nervous System: fatigue, weakness, forgetfulness, tremor, metallic taste, sleeping disturbances

### **DEFINITION OF AGRICULTURAL THW**

Waste from indiscriminate use of pesticides and fertilizers.

- ◆ Can be obsolete pesticides stored in leaking drums or torn bags
- ◆ Heavy rains may cause leaked pesticide to seep into ground and contaminate groundwater
- ◆ Poisoning Pathways
  - √ Direct contact
  - √ Inhalation of vapors
  - √ Drinking of contaminated water
  - √ Eating of contaminated food
- ◆ May also be a Fire Hazard

### **DEFINITION OF HEALTH CARE WASTE**

The total waste stream (solid and liquid) generated as a result of diagnosis, treatment or immunization of human beings or animals; research; production or testing of biologicals; may also include some veterinary waste and dead animals arising in research and public health laboratories

### **Major Sources of HCW are facilities with a significant volume of THW generated such as**

- ◆ Hospitals
- ◆ Clinics and maternity clinics
- ◆ Health Centers and dispensaries
- ◆ Laboratories- medical and biomedical, biotechnology
- ◆ Research Centers
- ◆ Blood Banks
- ◆ Mortuaries and autopsy centers
- ◆ Medical Schools
- ◆ Drug manufacturing

### **Minor Sources of HCW are facilities with a minimal volume of THW generated such as:**

- ◆ Physician's offices
- ◆ Dental clinics
- ◆ Acupuncturists
- ◆ Cosmetic piercing and tattooing
- ◆ Home treatment (dialysis), insulin injection, etc.)

## Categories of Health Care Waste

1. General Waste	Domestic type of waste from packing materials, non-infectious bedding, waste water from laundries, non-infectious waste	Administrative Offices Wards (surgery, OB-Gyne, Pediatrics, Medicine) Other Services (linen, laboratory, dietary, grounds, pharmacy, transport, research, central supply, morgue, dental, radiology, nursery)
2. Pathological Waste	Body parts, tissues, organs, fetuses, blood and body fluids, tissues from laboratories together with all related swabs and dressings	Wards (surgery, OB-Gyne) Other Services (laboratory, research, morgue, dental)
3. Infectious Waste	Cultures and stocks from laboratory work; Waste from surgeries and autopsies with infectious diseases, patients undergoing dialysis, infected animals	Wards Other Services (laboratory, research, dental) Isolation wards
4. Radioactive Waste	Solid, liquid and gaseous chemicals (hazardous and non-hazardous)	Laboratory Nuclear Medicine Radiology
5. Chemical Waste	Discarded solid, liquid or gaseous chemicals from laboratories or other sources such as diagnostic work, reagents, film development, experimental work, cleaning, housekeeping and disinfection procedures (disinfectant solvents)	Wards (surgery, OB-Gyne, pediatrics, medicine) Other Services (linen, radiology, laboratory, nursery)
6. Sharps	Includes needles, syringes, scalpels, blades, saws, nails, broken glasses and any other items which could cut or puncture infusion sets	Emergency Room Wards (surgery, OB-Gyne, pediatrics, medicine) Other Services (nursery, laboratory)
7. Pharmaceutical Waste	Pharmaceutical products and chemicals which have been returned from wards, have been spilled or soiled are out of date or contaminated; cytotoxic waste – cancer therapy	Out patient services Wards (surgery, OB-Gyne, pediatrics, medicine) Other Services
8. Aerosol and Pressurized Containers	Includes those used for treatment instructions or demonstrations purposes, those containing innocuous or inert gases and other containers which may explode if incinerated or punctured, gas cylinders, gas cartridges, aerosol	Out patient services Wards (surgery, OB-Gyne, pediatrics, medicine) Other Services (nursery, radiology, pharmacy)

**Waste containing heavy metals such as**

**MERCURY** - containing products and devices in health care facilities are:

- ◆ Sphygmomanometers
- ◆ Thermometers
- ◆ Esophageal dilators
- ◆ Thermostats
- ◆ Fluorescent bulbs

**LEAD can come from** batteries, paints, water pipes, old ceramics in health care facilities

**Waste Characterization Survey (WACS):**

**“SPECIAL WASTE” (household industry, hospital)**

- ◆ comprised 2% total waste generated based on WACS data of ECOGOV 1, in 2004
- ◆ comprised 6% of total waste generated according to NSWMC Status Report, in 2004

**“HOSPITAL THW” = comprised 20% of total hospital waste according to the WHO in 1999; the 80% mostly comes from the administrative and housekeeping functions of the facilities**  
**= waste generation is approximately 0.39 kg/bed/day based on hospital WACS study of the ADB in 2003**

**C. LEGAL AND POLICY FRAMEWORK**

National laws relevant to THW are

**C.1. RA 9003: Ecological Solid Waste Management (ESWM) Act of 2000**

Solid Waste – all discarded household, commercial waste, non-hazardous institutional and industrial waste, street sweepings, construction debris, agricultural waste, and non-hazardous/on-toxic solid waste.

**“Solid Waste”** as used in RA 9003 does not include waste identified or listed as hazardous waste of a solid, liquid, contained gaseous or semisolid form which may cause or contribute to an increase in mortality or in serious or incapacitating reversible illness, or acute/chronic effect on the health of persons and other organisms

**Health Care Waste:**

- ◆ Infectious waste from hospitals;
- ◆ Laboratory wastes;
- ◆ Disposable fomites that may harbor or transmit pathogenic organisms;
- ◆ Surgical operating room pathologic specimens and disposable fomites attendant thereto; and
- ◆ Similar disposable materials from outpatient areas and emergency rooms

### **Mining Waste**

- ◆ Waste resulting from mining activities, including contaminated soil and debris

### **Special Waste**

- ◆ Household hazardous wastes such as paints, thinners, household batteries, lead acid batteries, spray canisters and the like
- ◆ These include wastes from residential and commercial sources that comprise of bulky wastes, consumer electronics, white goods, yard wastes that are collected separately, batteries, oil and tires. These wastes are usually handled separately from other residential and commercial wastes

### **LGU ESWM Plan**

- ◆ Special Waste Component – shall include existing waste handling and disposal practices for special waste or household hazardous wastes, and the identification of current and proposed programs to ensure the proper handling, re-use, and long-term disposal of special wastes

### **Waste Characterization**

- ◆ Accurate characterization of wastes including determination of whether or not wastes will be compatible with containment features and other wastes, and whether or not wastes are required to be managed as hazardous wastes under RA 6969

### **Segregation of Solid Wastes**

- ◆ Mandatory
- ◆ Separate container for each type of waste from all sources
- ◆ Solid wastes container shall be properly marked or identified for on-site collection as: 1) Compostable; 2) Non-recycleble (Residual); 3) Recyclable; 4) Special Waste
- ◆ Segregated collection and transport

### **Reclamation Programs and Buy-back Centers for Recyclables and Toxins**

- ◆ LGU shall establish and implement deposit or reclamation programs in coordination with manufacturers, recyclers and generators to provide separate collection systems or convenient drop-off locations for recyclable materials and particularly for separated
- ◆ toxic components of the wastes stream like dry cell batteries and tires to ensure that they are not incinerated or disposed of in landfill.
- ◆ Toxic materials present in the waste stream should be separated at source, collected separately, and further screened and sent to appropriate hazardous waste treatment and disposal plants, consistent with the provisions of RA 6969.

### **Implementation**

- ◆ LGUs shall be primarily responsible for the implementation and enforcement of the provisions of RA 9003 within their respective jurisdictions.

## ***C.2. RA 6969: Toxic Substances and Hazardous and Nuclear Waste (TSHNW) Act***

**Hazardous Substances** – Substances which present either:

- ◆ Short-term acute hazards
- ◆ Long-term environmental hazards

### **Hazardous Wastes**

- ◆ Substances that are without any safe commercial, industrial, agricultural or economic usage and are shipped, transported or brought from the country of origin for dumping into or in transit through any part of the territory of the Philippines

- ◆ By-products, side products, process residues, spent reaction media, contaminated plant or equipment or substances from manufacturing operations, and as consumer discards of manufactures products or disposal

#### **Declaration of Policy**

- ◆ Regulate, restrict or prohibit the importation, manufacture, processing, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk and/or injury to health or the environment;
- ◆ Prohibit the entry, even in transit of hazardous and nuclear wastes and their disposal into the Philippine territorial limits for whatever purpose
- ◆ Provide advancement and facilitate research and studies on toxic chemicals.

#### **Scope**

- ◆ Importation, manufacture, processing, handling, storage, transportation, sale, distribution, use and disposal of all unregulated chemical substances and mixtures in the Philippines, including the entry, even in transit, as well as the keeping or storage and disposal of hazardous and nuclear wastes into the country for whatever purpose

#### **Objectives**

- ◆ To keep an inventory of chemicals that are presently being imported, manufactures, or used;
- ◆ To monitor and regulate the importation, manufacture, processing, handling,, storage, transportation, sale, distribution, use and disposal of chemical substances and mixtures that present unreasonable risk or injury to health or to the environment;
- ◆ To inform and educate the populace regarding the hazards and risk, and;
- ◆ To prevent the entry, even in transit, as well as the keeping or storage and disposal of hazardous and nuclear wastes into the country for whatever purpose.

#### **Implementation**

- ◆ DENR – Implementing Agency
- ◆ Inter-Agency Technical Advisory Council – Provide assistance to the DENR in the implementation of RA 6969

#### **Prohibited Acts**

- ◆ Knowingly use a chemical substance or mixture which is imported, manufactures, processed or distributed in violation of the Act or IRR or orders
- ◆ Failure or refusal to submit reports, notices or other information, access to records as required by the Act, or permit inspection or establishment where chemicals are manufactures, processed, stored or otherwise held
- ◆ Failure or refusal to comply with the pre-manufacture and pre0importation requirements; and
- ◆ Cause, aid or facilitate, directly or indirectly, in the storage, importation or bringing into Philippine territory, including its maritime economic zones, even in transit, either by means of land, air or sea transportation or otherwise keeping in storage any amount of hazardous and nuclear wastes in any part of the Philippines

#### Under RA 6969 IRR (DAO 29) – DENR Policy on Hazardous Waste:

- ◆ Prohibit the entry even in transit of hazardous wastes and their disposal into the Philippine territorial limits for whatever purpose
- ◆ Encourage proper management of hazardous wastes generated within the country by promoting, in order of preference:
  1. Minimization of generation
  2. Recycling and re-use
  3. Treatment to render it harmless
  4. Landfill or inert hazardous waste residues

- ◆ Hazardous wastes shall be managed in such a manner as not to cause or potentially cause
  - Pollution
  - State of danger to public health, welfare and safety
  - Harm to animals, birds, wildlife, fish or other aquatic life
  - Harm to plants and vegetation
  - Limitation in the beneficial use of a segment of the environment
- ◆ Waste generator shall be responsible for the proper management and disposal of the hazardous waste
- ◆ Waste generator shall bear the costs for the proper storage, treatment and disposal of their hazardous wastes

### ***C.3. RA 8749: Clean Air Act (CAA) of 1999***

#### **Among the Declaration of Policies:**

- ◆ Focus primarily on pollution prevention rather than on control and provide for a comprehensive management program for air pollution

#### **Ban on Incineration**

- ◆ Incineration, which is defined as the burning of municipal, biomedical and hazardous wastes, which process emits poisonous and toxic fumes, is prohibited
- ◆ Prohibition shall not apply to traditional small-scale method of community/neighborhood sanitation “siga”, traditional, agricultural, cultural, health and food preparation and crematoria
- ◆ Existing incinerators dealing with bio-medical wastes shall be phased out within three (3) years after the effectivity of the Act
- ◆ DENR shall promote the use of state-of-the-art, environmentally-sound, and safe non-burn technologies for the handling, treatment, thermal destruction, utilization, and disposal of sorted, unrecycled, uncomposed municipal, bio-medical and hazardous wastes.

#### **Implementation**

- ◆ The DENR shall be the primary government agency responsible for the implementation and enforcement of the Act unless otherwise provided therein.
- ◆ The DENR shall consult, participate, cooperate and enter into agreement with other government agencies, or with affected NGOs or POs, or private enterprise in the furtherance of the objectives of the Act.
- ◆ LGUs shall share the responsibility in the management and maintenance of air quality within their territorial jurisdictions.

### ***C.4. RA 9275: Clean Water Act (CWA) of 2004***

#### **Among the Declaration of Policies:**

- ◆ To provide for a comprehensive management program for water pollution focusing on pollution prevention

#### **Among the Prohibited Acts**

- ◆ Disposal of potentially infectious medical waste into sea water by vessels unless the health or safety of individuals on board the vessel is threatened by a great and imminent peril
- ◆ Transport, dumping or discharge of prohibited chemicals, substances or pollutants listed under RA 6969
- ◆ Operate facilities that discharge or allow to seep, willfully or through gross negligence, prohibited chemicals, substances or pollutants listed under RA 6969 into water bodies or wherein the same shall be liable to be washed into such surface, ground, coastal and marine water

### **Implementation**

- ◆ The DENR shall be the primary government agency responsible for the implementation and enforcement of the Act unless otherwise provided therein.
- ◆ LGUs shall share the responsibility in the management and improvement of water quality within their territorial jurisdictions.

#### **C. 5. RA 7160: Local Government Code of 1991**

- ◆ The Sangguniang Bayan / Panglungsod, as the legislative body of the municipality/city, shall enact ordinances, approve resolutions and appropriate funds for the general welfare of the municipality/city and its inhabitants
- ◆ Regulate the disposal of clinical and other wastes from hospitals, clinics, and other similar establishments

#### **C.6. RA 4226: Hospital Licensure Act (HLA)**

- ◆ Requiring the Licensure of ALL HOSPITALS in the Philippines and mandating the DOH to provide guidelines and technical standards as to personnel, equipment and physical facilities for hospitals, clinics, lying-ins and similar establishment

#### **C. 7. Relevant International Agreements:**

As a signatory of international agreements, the Philippines is duty bound to uphold the provisions listed below:

- ◆ **Rotterdam Convention on the Prior Informed Consent (PIC) Procedure for Certain Hazardous Chemicals and Pesticide in International Trade** - regulated the export and import of the most dangerous pesticides and chemical products
  - Products subject to the convention may not be exported unless the importing country has been duly informed about the nature of the product and has given its consent, a process known as “prior informed consent” or PIC.
- ◆ **Basel Convention on Transboundary Movement of Hazardous Wastes** - In the late 1980’s, a tightening of regulations in industrialized countries led to a dramatic rise in the cost of hazardous waste disposal, resulting in the “dumping” of toxic waste in developing countries.
  - The Basel convention regulates the transboundary movement of hazardous waste: the only legitimate transboundary movement of hazardous waste is exports from countries without facilities, or expertise to dispose safely of certain waste, to countries which have both facilities and expertise. Exported waste should be labeled according to United Nations recommended standards
- ◆ **Stockholm convention on Persistent Organic Pollutants** - The Stockholm convention is a global treaty to protect human health and the environment from persistent organic pollutants (POPs). POPs are chemicals that remain intact in the environment for long periods, become widely distributed geographically, accumulate in the fatty tissue of living organisms and are toxic to humans and wildlife.
  - Governments should take measures to eliminate or reduce the release of 12 POPs into the environment.
- ◆ **The Montreal Protocol on Substances that Deplete the Ozone Layer** – The Montreal Protocol was finally agreed upon on 16 September 1987 and it finally came into force January 1, 1989 with its final objective the “elimination” of ozone-depleting substances such as halocarbons.

**C.8. Environment Principles which are relevant to THW are:**

- ◆ **Polluter Pays Principle**  
All Wastes Producers are legally and financially responsible for
  - Safe handling and environmentally sound disposal for the waste they produce
  - Creates an incentive to produce less waste
  - Wherever practicable, the polluter should pay for the costs they impose on the environment
  
- ◆ **Precautionary Principle is a key principle governing health and safety protection**  
Where risk is uncertain or unknown:
  - Assume that risk is significant
  - Plan health and safety protection measures accordingly
  
- ◆ **“Duty of Care” for wastes**
  - The “duty of care” principle stipulates that any person handling or managing hazardous substances or related equipment is ethically responsible for applying the utmost care. THW generators have responsibilities or “duty of care” for the environment and public health, particularly in relation to the waste they produce. They carry a responsibility to ensure that there are no adverse health and environmental consequences as a result of waste handling, treatment and disposal activities.
  
- ◆ **“Proximity Principle”**
  - Treatment and disposal of wastes takes place as near as possible to the point of production as is technically and environmentally possible, in order to minimize the risks linked to transport

**Role of LGU, EMB, and DOH relative to National Laws and their provisions**

National Laws	ROLE OF		
	LGU	EMB	DOH
Ecological Solid Waste Management Act of 2000	ESWM plan formulation, implementation, regulation/enforcement (ordinances, MOA), mandatory segregation	Regulatory/ Enforcement	Advocacy (IEC on health impact)
Toxic Substances & Hazardous Nuclear Waste Control Act of 1990	Monitoring compliance of waste generators & TSD operators/treaters	Regulatory/ Enforcement	Advocacy (IEC on health impact); Registration of DOH hospitals as waste generators
Philippine Clean Air Act of 1999	Monitoring compliance; Regulatory/ Enforcement (ordinance, MOA)	Regulatory/ Enforcement	Advocacy (IEC on health impact; compliance of DOH owned hospitals)
Clean Water Act of 2004	Monitoring compliance	Regulatory/ Enforcement	Advocacy on health impact; monitoring compliance
Local government Code of 1991	Regulatory/ Enforcement (ordinance, MOA)	Monitoring compliance	Monitoring compliance

# Part 2

## Toxic and Hazardous Waste Management Process

**P**art 2 will present the THW management process vis-à-vis SWM. A review of EcoGov 1 ISWM planning process and assessment of results will be made. EG 1 Waste assessment, characterization and survey (WACS) data, current WACS data or data from other sources will be presented and an analysis will be done on the “special waste” or THW identified and quantified from different sources. The following could be the guide questions for the participants:

- a. What do the data tell us?
- b. What do the data not tell us?
- c. How can we integrate THW into SWM planning?

Each step of the SWM planning process (**Annex 2: Steps in the ISWM Planning and Legitimization Process**) will be presented and THW concerns in each step will be discussed. Consensus on THW component as well as agreements on its integration to ISWM plan will be made.

In order to assess participants’ baseline knowledge on the THW management process (minimization, segregation, recycling/ reuse, on site and offsite collection storage, treatment and disposal), a **room exercise (Annex 3: Identification of Source and Management of THW in ISWM)** will be conducted. Participants will be grouped randomly and will be asked to identify the different sources of simulated THW. After which, they will be asked to outline or draw the ideal THWM process for each type of THW.

Input will be made on the proper management of THW from the four (4) major sources: households, agriculture, industry and health care facilities. Examples of best practices with respect to specific THW will be cited.

### Expected Output of Part 2

Part 2 will give the participants an understanding of the THWM process and its integration into the ISWM process. It will help them in their analysis of data gaps of their WACS activities. LGU participants will be capacitated to improve and integrate THWM into their ISWM plan which is a prerequisite for drafting their own THWM ordinance, information education and awareness materials, engineering options, as well as come up with institutional arrangements for implementation and monitoring.

### Participants

City/municipal planning officer, City/ municipal health officer, CENRO/ MENRO, Chairman / Kagawad on the environment, Provincial environment officer, Provincial health officer/ Sanitary engineer/Sanitary inspector, Regional EMB

### Timeframe

Part 2-room exercise as well as lecture input will entail half day

**Reference materials for Part 2 lecture notes:**

Toxic Substances Hazardous Nuclear Waste Act (RA 6969); Safe Management of Wastes from Health Care Activities. World Health Organization, Geneva, Switzerland, 1999.

**Lecture Notes**  
**Toxic and Hazardous Waste Management Process**

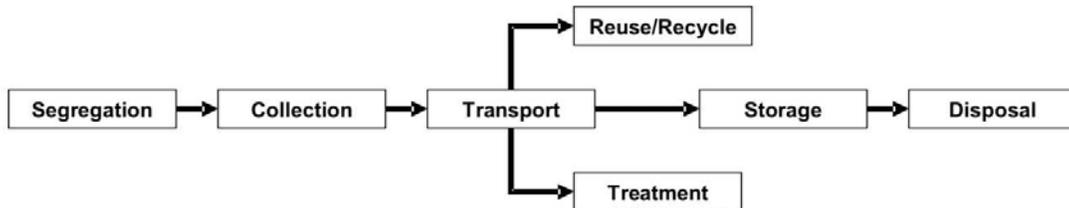
**A. Household THW**

**1. Waste Minimization is the key to reduce THW in the first place**

List of Hazardous Waste Alternatives in the household

Glass Cleaner	2 tablespoon of vinegar to 1 quart of water
Air Freshener/Odor Removal	Charcoal
Coffee Cup Stain Removal	Use moist salt
Handcleaner: Paint/Grease	Baby oil
Tile Cleaner	Baking Soda
Copper Cleaner	Lemon juice or calamansi or salt
Spot Removal	Lemon juice or calamansi or salt
General Cleaner	1 tsp. Liquid soap plus one squeeze of lemon or calamansi in quart of warm water
Stainless steel polish	Mineral oil
Linoleum Floor Cleaner	1 cup white vinegar plus 2 gallons water
Car Battery Corrosion	Baking soda and water
Furniture/Wood Polish	Rub furniture with 1tbsp of lemon/calamansi or mixed with 1 pint of mineral oil
Toilet Bowl cleaner	Baking soda and vinegar

**Management of Household THW**



**2. Proper Segregation**

- > Recycling = Motor oil – back to automobile repair shops
- Household pesticides – back to manufacturers (e.g. Bayer)
- Lead and batteries – back to Philippine Recyclers Inc.

**3. Collection - Designate a collection day**

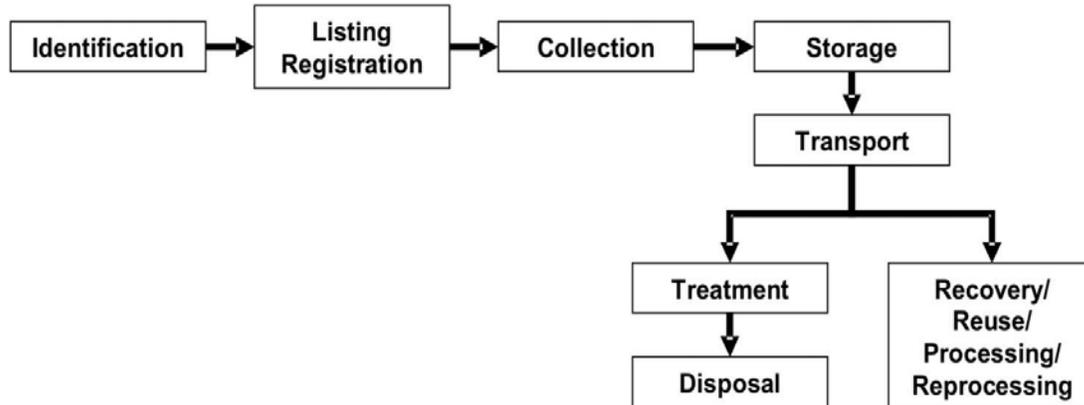
**4. Disposal – Designate a special cell in the landfill**

**B. Industrial THW Management**

There are 3 basic principles in the management of industrial THW:

- ◆ Waste Minimization
- ◆ Pollution Prevention
- ◆ Cleaner Production

## Management of THW from Industry



### ***Treatment Methods***

The following treatment methods for THW are currently available in the Philippines. There are currently facilities accredited by the Environment Management Bureau:

- ◆ Physical/chemical treatment – soil washing, solvent extraction, filtration, distillation
- ◆ Neutralization (for acidic or alkaline waste)
- ◆ Stabilization/solidification (heavy metals)
- ◆ Remediation
- ◆ Encapsulation
- ◆ Fuel Substitution
- ◆ Aqueous treatment

### **Industrial THWM Plan**

Requirements of an Industrial THWM plan are the following:

- ◆ THW registration of waste generators, transporters and TSD facilities
- ◆ THW reduction at source
- ◆ THW categorized, labeled and stored properly
- ◆ Recycling/reuse
- ◆ Processing/reprocessing
- ◆ Collection/treatment-neutralization, smelting, acidification, distillation, encapsulation

### ***DAO No. 29 – Implementing Rules and Regulations of RA 6969***

This DAO outlines the requirements of THWM plan in Industries. LGUs must be vigilant in monitoring the compliance of industries to these provisions:

### ***Goals of Title III***

#### **Section 24 - Minimization of waste generation**

- ◆ Recycling and reuse of hazardous waste
- ◆ Treatment of hazardous wastes
- ◆ Landfill of inert hazardous waste residues

**Section 25 – Waste Identification**

- ◆ Identified broad classes and subcategories of hazardous wastes
- ◆ Established broad exemptions of certain waste streams

**Section 26 – Generators**

- ◆ Requirement for waste generators: Notification, Reporting, Planning, Training

**Section 27 and 28 – Transporter and Transport Record**

- ◆ Established a permitting program for transporters of hazardous waste
- ◆ Required that generators only use authorized transporters to transport hazardous waste
- ◆ Required tracking the movement of hazardous wastes from the point of generation to the ultimate disposal location (“cradle to grave”)

**Section 29 – Hazardous Waste Storage and Labeling**

- ◆ Required that vessels, containers and tanks storing hazardous waste be clearly labeled with proper information

**Section 30 – Waste Treatment and Disposal Premises**

- ◆ Defined categories of acceptable waste management premises (also referred to as hazardous waste treatment, storage or disposal facilities)
- ◆ Required that all waste management premises must receive permits from DENR before accepting hazardous wastes from off-site sources

***Storage of Industry THW- all THWs must be properly labeled******Treatment Process: Solidification Stabilization***

This is applied to wet sludge or solid wastes containing heavy metals such as lead, arsenic, chromium, cadmium, boron, selenium and mercury.

***Disposal of Industrial THW2***

- ◆ Siting of THWM disposal facility must not be in sensitive areas (e.g. flood plains, wet lands, ground water, earthquake zones)
- ◆ Consider non-technical factors: people, infrastructure, emergency evacuation

**C. On Site Health Care Waste Management (HCWM) Plan**

Steps in planning an on site health care waste management:

- ◆ Assess present situation and carry out a waste survey
- ◆ Identify opportunities for minimization, reuse and recycling
- ◆ Identify handling, treatment and disposal options
- ◆ Evaluate options
- ◆ Identify key personnel
- ◆ Establish a record keeping system
- ◆ Estimate related costs
- ◆ Prepare training program
- ◆ Prepare implementing strategy

## HCWM Administrative Requirement

### Organization: Health Care Waste Management Committee

Chief of Hospital/HC Facility/Medical Director – Chair  
Heads of Department – Housekeeping, Maintenance, Motor pool  
Infection Control Officer  
Chief Pharmacist  
Radiation Officer  
Senior Nursing Staff  
Facility Engineer  
Financial Controller  
Health Educator/Information Officer  
Waste Management Officer – Pollution Control Officer

### *Functions of HCWM Committee*

1. Policy formalizing commitment
2. Plan formulation
3. Monitoring and Evaluation

### *HCWM Plan - Must contain the following:*

1. Assessment of waste generation and HCWM system
2. Design : Generation ® segregation ® storage ® treatment® disposal
3. Training
4. Monitoring and Evaluation

### *Occupational Health and Safety*

Requirements for waste management personnel are:

- ◆ Personal Protective Equipment- gloves, mask, coverall, boots
- ◆ Personal Hygiene
- ◆ Immunization
- ◆ Safe use of cytotoxic drugs

## Emergency Response Communication Training

### *C.1. Waste Minimization – in health care facilities it includes*

**Source reduction** – improve housekeeping practices by eliminating use of chemical freshener; use of digital thermometers; substitute with steam disinfection

- ◆ **Use of recyclable products** - e.g., organics, plastics, paper, glass, metal
- ◆ **Purchasing policy** – “first in, first out”
- ◆ **Segregation** – composting, recycling
- ◆ **Stock management** – expiry date of any product upon delivery

### *C.2. Waste Segregation*

- ◆ Key to waste minimization; sorting of waste into waste categories, leads to reduced quantities of hazardous waste, thus greatly reducing the cost for safe disposal of hazardous health care waste
- ◆ Essential for effective waste management
- ◆ Improves public health protection
- ◆ Should be done according to specific treatment and disposal requirements

- ◆ Should be carried out by waste generator
- ◆ Same segregation from generation until disposal

**Color Coding** – health care facilities are recommended to have the following color coding for plastic liner or container in their waste receptacles in order to facilitate waste segregation

- ◆ **Green** -- biodegradable, non-infectious
- ◆ **Black** – non-biodegradable, non-infectious
- ◆ **Yellow** – infectious, pathological
- ◆ **Orange** – nuclear
- ◆ **Red** – sharps and needles

### **C.3. On-Site Waste Collection**

- ◆ Establish a routine programme for collection
- ◆ Collect ward waste **daily**
- ◆ Waste bags should be sealed (3/4 full)
- ◆ All containers and bags should be labeled
- ◆ Full containers should be immediately replaced with empty containers or bags
- ◆ Should be designed to achieve an efficient movement of waste from points of generation to storage or treatment while minimizing the risk to personnel

### **C.4. Waste Storage Facility Requirements**

- ◆ Impermeable, hard standing floor
- ◆ Good drainage
- ◆ Easy to clean surfaces
- ◆ Convenient water supply
- ◆ Readily accessible to staff
- ◆ Secure and lockable
- ◆ Good lighting and ventilation
- ◆ Proofed against rodents, insects and birds

Waste storage period: 48 hr in cool season; 24 hr in hot season

### **C.5. On-Site Transport: Requirements for an onsite transport are**

- ◆ Wheeled trolleys, containers, or carts dedicated for on-site transport
- ◆ Easy to load and unload
- ◆ No sharp edges that could damage waste bags or containers
- ◆ Easy to clean
- ◆ Should be cleaned and disinfected daily
- ◆ Waste transporters: proper personnel protective equipment

## **ON SITE HEALTH CARE WASTE FLOW:**

**Biodegradables** such as kitchen waste should be collected and stored in green receptacles and may be composted or can sold to hog dealers; **patient** left overs should undergo composting.

**Non infectious dry waste** such as used sterile IV bottles, cartoons , unsoiled paper, cans and bottles should be collected and stored in black receptacles, brought to the material recovery facility and may be **recycled or be recovered**.

**Infectious waste** should be collected separately in a yellow receptacle and should be sanitized immediately by using chemical disinfection or be sterilized using Autoclave or microwave before disposal.

**Pathological waste** should be collected in yellow bags and should undergo chemical treatment before being disposed in a concrete vault or undergo safe burial

**Sharps** should be collected and stored in red puncture proof containers, may undergo chemical disinfection and treatment before safe burial and encapsulation; if sharps will be encapsulated, it will be convenient to collect them directly in metallic drums or barrels used for encapsulation, which will limit handling hazards

**Aerosol and pressurized container** should be collected and disposed by the supplier.

**Chemical and some pharmaceutical waste** should be collected in yellow containers and undergo neutralization or inertization before disposal.

**Radioactive waste** should be stored in orange containers and should undergo delay to decay process, then collected and disposed by the supplier or the Philippine Nuclear and Radiological Institute.

#### **THWM – Other Factors to consider in the proper management of health care waste:**

**Public Sensitivity** – some communities are sensitive about incidents involving HCW and about visual impact of HCW

**Cultural Practices** such as returning body parts (i.e., placenta and severed limbs) To patients or relatives for safe burial, should be taken into account

#### **WASTEWATER MANAGEMENT**

- ◆ It is recommended that a healthcare facility should have an on-site waste water treatment plant
- ◆ Sludge from the treatment plant should be disposed of in accordance with the prescribed rules and regulations (sanitation code)

# Part 3

## THW Situational Analysis and Assessment

**P**art 3 will guide the LGU in conducting a situational analysis and assessment of its THW. It will provide an overview of the need for, and the scope of the THW assessment. There are a number of factors that need to be analyzed prior to the development of a THWM plan as an integral part of ISWM, considering that THW can come from household, industrial, agricultural and health care facilities. The most critical quantitative and qualitative information needed to do a good situational analysis and to establish a database will be discussed in this section, including data sources and the methods that may be used to generate them. It will focus on the relevance of the information gathered for THWM planning. The participants are expected to have a clear idea of the types of primary and secondary information that will be needed for the situational analysis, and the range of methods that can be used to generate the needed information.

This could be done through primary data gathering (survey and through actual site visits or focus group discussions/key informant interviews) or through secondary data gathering (from the LGU database of industries/ businesses or from the local health department for health care facilities). Part 3 will open with a lecture orientation on the scope and methodology of THW assessment.

THW assessment is both quantitative and qualitative. For quantitative assessment, the results of EG1 WACS in the concerned LGU may again be revisited. A verbal validation (question and answer) on the type and amount of waste generated may be done. A useful **tabletop exercise (Annex 4: Estimation of Health Care Waste Generation)** will allow the participants to roughly estimate the amount or quantity of health care waste generated per hospital if the number of beds and bed occupancy rate is known. This data will give a rough estimate of the hazardous waste generated by health care facilities assuming that the quantity and corresponding bed capacities is known. This data will in turn give LGUs a rough estimate of the THW generated by health care facilities, the waste fraction that needs treatment and eventual disposal in a special cell in the disposal area, the volume of which must also be estimated for engineering and investment needs.

Qualitative assessment will also be done by doing an inventory of THW major sources from industries and health care facilities (**Annex 5: Inventory of Common THW Sources**). Participants will be given a walk through of a guide matrix or the documentation of industrial and health care facilities, as well as current THWM practices, detailing key questions that may be asked and specific practices that will be observed and documented. For some LGUs in the rural areas, agricultural sources (such as pesticide use, amount, hazard class, treatment and disposal practices) should be included. Another useful tool is a questionnaire on current THWM practices (**Annex 6: Survey on Health Care Waste Management Awareness and Practices**). This sample survey of health care waste management practices will be done in order to orient the LGU on HCW process that needs to be monitored and regulated.

There will be a field exercise (**Annex 7: Toxic and Hazardous Waste Assessment**) where participants, using a suggested tool, will learn to document and assess the HCW generation, storage, collection, treatment and disposal practices (waste flow) in a selected health care facility. This half-day field exercise/practicum on health care waste management flow is designed to provide participants some hands on training in categorizing health care waste/industrial waste from different sources. This should give the participants a

better understanding of the processes involved and the information that will be generated. They will be grouped into 5 and assigned to describe waste flow from 5 sources, one hospital ward, one hospital outpatient department/ emergency room, one laboratory/ blood bank, one funeral parlor or health center and common source of industrial waste in the area (such as gasoline station or car repair shops) which have been all pre sampled or pre identified. The participants will be assigned specific tasks, and will be able to work on specific THW waste flow, which are what they are expected to encounter when they do the actual assessment in the LGU. After the field exercise, the participants will be guided in processing their learning from the exercise sub module.

Their experiences in the exercises in part 3 will allow the participants to identify the tools (both quantitative and qualitative) to be used in assessing LGU THW and to plan for the replication of the assessment activity in their respective LGUs. The LGU knowledge on situational analysis and assessment will be useful in deciding the type of IEC to be conducted, ordinance and other enforcement instruments, engineering options, financing and budgetary support, and organizational set-up for waste generators to implement a sustainable THWM plan. More importantly, the assessment will guide the LGUs in deciding clear institutional mechanisms for THWM monitoring and regulation.

Part 3 will cover:

- ◆ Orientation on Assessment, Scope and Methodology
- ◆ Quantitative Assessment: Validation of waste characterization
- ◆ Qualitative Assessment: THWM Source Inventory, Survey of HCWM Awareness and Practice, Survey of HCWM Waste Flow

### **Expected Output of Part 3**

Action plan to complete all preparatory activities and for the actual collection of both primary and secondary data for both quantitative and qualitative assessments, to include questionnaires and other recording instruments.

The final output of this part is a THWM situational analysis and THW assessment. Major elements of the situational analysis are: a) validation of EG1 THW WACS done in terms of sources, composition, and quantity b) estimation of the volume of hazardous health care waste generated per bed per day, hence estimation of the proportion of waste requiring treatment to render it nonhazardous) approximation of the quantity of hazardous health care waste generated in the facilities to total LGU waste requiring disposal (either onsite or offsite) d) data on LGU THW potential sources e) data on waste generators awareness and practices on THWM (health care waste , industry and in selected LGUs, agricultural sources)

### **Participants**

The participation of as many sectors as possible is encouraged in this part. It will be helpful if the activity involve members of the ESWM board, representatives from the Regional DENR, DOH, EMB, representatives from the Provincial Health Office, DOH representative City / Municipal Environment - Sanitation division, from the industry, health care facilities, from the TSD facilities, academe, non government organizations, as well as people's organizations.

### **Timeframe**

The orientation on THW assessment and field exercise will cover one half day. In the sub modular approach of waste assessment and survey, this will take about two weeks to complete.

**References for Part 3 Lecture Notes:**

Basic Environmental Health. WHO. Geneva, Switzerland. 1998.

Final Report of the MM Solid Waste Management Project, ADB TA. DENR, Quezon City, Philippines, 2003.

National Solid Waste Management Commission Annual Report. DENR, Quezon City, Philippines, 2004.

Health Care Waste Management Rapid Assessment Tool, WHO, Geneva, Switzerland. 2005.

ISWM Waste Characterization and Assessment Survey Reports, Philippine Environmental Project 1, USAID TA. DENR, Quezon City, Philippines. 2004.

## **Lecture Notes**

**Objectives of assessment:** inventory of sources and magnitude of THW in the area, encourage LGU advocacy, and determine LGU interest and support

- ◆ To identify and analyze key factors that are important to THW planning and use analysis as inputs/ basis for planning (informed decision-making)
  - IEC
  - Policy and Ordinance
  - Financing
  - Organizational/Administrative
- ◆ To establish baseline data for THWM monitoring and evaluation of program inputs

### **What is THW Waste Characterization?**

The process of gathering information on the sources of THW in the LGU and essential THW data (total rate of waste generation, composition, quantity and density), daily waste generation per bed and the source, potential waste diversion of compostable and recyclables

### **Why THW WACS?**

THW WACS – is essential in planning for an effective THW management as an integral part of ESWM

WACS data will be useful in:

- ◆ Developing strategies and activities to manage LGU THW
- ◆ Reducing waste generation
- ◆ Diverting compostable/recyclable waste from treatment and disposable facilities
- ◆ Providing options for THW treatment

### **Two Types**

#### **1. Qualitative**

- ◆ Inventory of point sources
- ◆ Survey of THW awareness and practices
- ◆ Survey of THW waste flow

#### **2. Quantitative**

- ◆ Extrapolation of health care waste generation based on bed capacity

### **Data Generation Methods**

#### ***Primary data collection – for THW sources and practices***

- ◆ Actual site visits/observation
- ◆ Key informant interviews
- ◆ Focus group discussion
- ◆ Sample survey
- ◆ Direct measurement

#### ***Secondary Data Dollection***

- ◆ From mayors and other Local Government Executives
- ◆ From LGU databases of industries, businesses operating in the area

- ◆ From local health departments – for a listing of health care facilities

**Qualitative data:**

**- Scope and Coverage:**

- ◆ **Industries:** by type- materials extraction, processing, manufacturing, service industries Current waste management practice (registration, collection, reuse/recycle, storage, treatment, disposal, and presence of TSD facilities)

**Health cares facilities:**

- ◆ By type - hospitals, health centers, private clinics, laboratories, medical schools, Blood banks, mortuaries
- ◆ By levels - national, regional, provincial, district, city/ municipal
  - First, second, third level / medical center

Current waste management practices (minimization, segregation, collection, storage, treatment onsite/ offsite, disposal, and presence of available nonburn technologies)

**Hospital waste:**

- ◆ By type - general/ domestic (biodegradable, recyclable), toxic and hazardous (infectious/ pathological, blood and blood products, sharps, laboratory/chemical, radiologic/ nuclear, pharmaceutical/cytotoxic, waste with heavy metals, other special waste

Agricultural waste: pesticides by hazard class, amount used, methods of treatment and disposal.

**Common Industry TWH Sources**

Classification	Yes/No	If, yes, # of establish- ments	Current waste Management practice		Remarks
			Treatment	Disposal	
1. Materials extraction industry a) Mining metals and minerals b) Coal mining and production					
2. Processing industry a) Iron and steel production b) Cement, glass, ceramics c) Petrochemicals, refineries d) Leather, tanning e) Food processing – abattoirs f) Fish processing					
3. Materials extraction industry a) Paper and pulp b) Plastics c) Synthetic fibers d) Pesticides e) Machine and equipment assembly (e.g. computer)					
4. Service industry a) Hotels b) Restaurant c) Power generation d) Power distribution e) Gasoline stations f) Electroplating					

## Health Care Facilities

Type	Number	Current waste management practice	
		Treatment	Disposal
1. Private clinics			
2. Government health centers			
3. Laboratories			
4. Blood bank			
5. Medical/nursing/midwifery school			
6. Mortuaries/funeral parlors			

- ◆ **Treatment Methods** – autoclave, microwave, pyrolysis, chemical treatment, biological
- ◆ **Disposal** - sanitary landfill, safe burial, septic/concrete vault

## Hospitals

7. Hospitals	Number	Type*	Bed Capacity

- ◆ **First Level** – non-departmentalized hospital that provides clinical care and management on the prevalent disease in the locality.
- ◆ **Secondary Level** – non-departmentalized hospital that provides clinical care and management on the prevalent diseases in the locality as well as particular forms of treatment, surgical procedure and intensive care.
- ◆ **Tertiary Level** – teaching and training hospitals that provides clinical care and management on the prevalent diseases in the locality as well as specialized and sub-specialized forms of treatment, surgical procedure and intensive care.
- ◆ **Birth home** – a health facility that provides maternity service on pre-natal and post-natal care, normal spontaneous delivery and care of newborn babies
- ◆ **Infirmery**: a health facility that provides emergency treatment and care to the sick and injured, as well as clinical care and management to mothers and newborn babies.

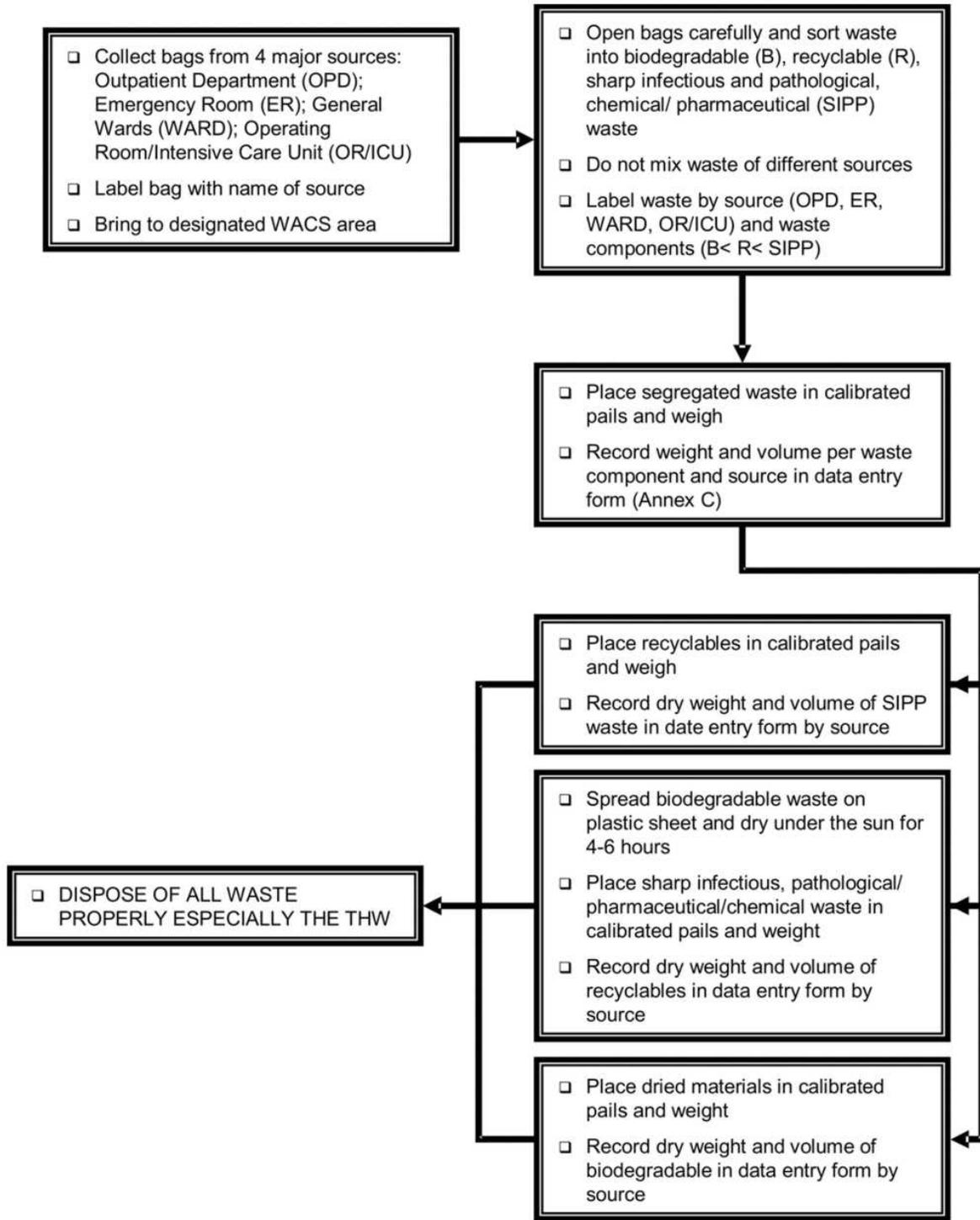
## Stages of THW WACS

### A. Preparatory Stage

- ◆ Identify waste source (specific health care facility/hospital)
- ◆ Prepare introduction letter from the Mayor/Governor and instruction sheets for the cooperators, orient cooperators and distribute color coded plastic bags (12 bags per facility)
- ◆ Procure required tools and materials; calibrate the volume of plastic pails and get their empty weights
- ◆ Prepare tags: OPD; ER; WARD, OR/ICU; BIODEGRADABLE; RECYCLABLE; THW
- ◆ Identify suitable waste characterization site in the facility
- ◆ Prepare and reproduce copies of recording forms and interview questionnaire
- ◆ Train participants on procedures to include safety and health guidelines – proper personnel protective equipment-mask, gloves, cover all; form teams and assign tasks to members of each team

# Waste Chacterization Process

(3 days — 2 weekdays, 1 weekend)



## Expected Tables and Graphs

- ◆ **THW source inventory by types**
  - Industry
  - Health care facility
  - Hospital: national, provincial, city/municipality
  - Hospital by level: first, second, third, infirmary
  
- ◆ **THW awareness and practice**
  - Treatment and disposal methods by industry
  - Treatment and disposal methods by health care facilities

# Part 4

## Key Elements of an LGU THW Management Plan

**P**art 4 will provide inputs to the formulation of a LGU THW management strategy and action plan which will form part or be integral to the ISWM plans. In particular, this will provide a review of the responsibilities of THW waste generators (health care facilities and industries) and THW treaters (owners of TSD facilities) and discuss the range of actions (regulation and enforcement, IEC, multi-agency monitoring, engineering and investments in THW management facilities, institutional arrangements, and other joint actions) that an LGU may take. The discussion will focus on how the LGUs can interface with partner agencies (DENR-EMB, DOH, other organizations) in the regulation of THW disposal and in monitoring the implementation of the THW management plans of key THW waste generators and treaters. Examples of local ordinances, IEC support programs, engineering, monitoring compliance and multi-agency institutional arrangements will be used to show the options that are available to an LGU. Costs and financing options will also be provided, along with organizational/administrative requirements for waste generators and treaters which the LGU might want to monitor.

For this and the subsequent session to proceed, the participants in the first three parts should have completed their qualitative waste characterization and assessment and as well as quantitative waste characterization (through validation and estimation).

### Expected output of Part 4

The output of this module is a clear understanding of the key elements of an LGU THWM plan to include policy support, IEC and advocacy, engineering and technology options, monitoring compliance, as well as multiagency institutional arrangements.

An LGU THW Management Plan must have the major components or essential elements. Each component or strategy is discussed in detail as follows:

1. Enforcement (ordinance formulation and monitoring)
2. Education (IEC, advocacy, awareness raising)
3. Engineering and Investments
4. Institutional arrangements

### Participants

ESWM board, DOH and DENR EMB regional coordinators, sanitary engineers, Municipal/ City health officers, PENRO/CENRO/MENRO, representatives from the industry, health care facilities, pollution control officers, from the TSD facilities, non government organizations, as well as people's organizations

### Timeframe

Orientation to this session will cover one day; Actual drafting of THWM plan and incorporation into the ISWM plan will entail at least 2 weeks

## References for Part 4 Lecture Notes

Philippine Ecological Solid Waste Management Act of 2000 (RA 9003)  
Philippine Toxic Substances Hazardous and Nuclear Waste Act of 1991 (RA 6969)  
Philippine Clean Air Act of 1999 (RA 8749)  
Philippine Clean Water Act of 2004 (RA 4275)  
Philippine Hospital Licensure Act of 1981 (RA 4226)  
Philippine Local Government Code of 1991 (RA 7160) and their respective IRRs  
Safe Management of Wastes from Health Care Activities, WHO, Geneva, Switzerland, 1999.

### **PartT 4A: Policy Support: Enforcement and Ordinance Formulation**

This component will help ensure compliance by waste generators and treaters with the international agreements and principles as well as national legislations relevant to THW. The component will identify the specific actions in the plan that need to be supported with or translated into LGU ordinances and define the corresponding enforcement mechanisms that need to be put into place. Policies and ordinances should incorporate good governance principles, in order that TAP principles in planning are carried into the implementation process.

There will be a brief input lecture on the basis and content of the policy support component and a walk through of ordinance guide developed by EcoGov. Then the participants will be provided basis for authority to enact ordinance, recommend contents of THW ordinance. A joint circular between the DENR and DOH on health care waste management (**Annex 8**) will likewise be reviewed in order for the participants to draft its own policies and ordinances consistent with such circular.

During this training, the following should be made available to the participants as critical inputs: compilation of THWM national laws and international agreements (Part 1), a summary of THWM strategies and engineering /technology options (Part 4) and the staffing plan of the industry/health care facility as well as the LGU ESWM organization.

#### **Expected output**

The output of this part is a draft policy support component (ordinances), meant to regulate THWM, and which forms part of the ISWM plan. Part of the output would be a list of the priority ordinances that will have to be enacted to support monitoring of the plan, the proposed content of the ordinance, and the identified enforcement mechanisms. Upon completion, the LGU can initiate drafting the THWM ordinance, which can be issued as soon as the THWM plan has been drafted.

#### **Participants**

A task force for THW policy support can be organized for this part. This may include the ESWM board, Chairs of the SB/SP committees on health and environment, and representatives from the enforcement bodies such as barangay tanod and local police. A lawyer could be a useful resource person for all laws relevant to THWM, and must also be knowledgeable on governance principles.

#### **Timeframe**

2 days (can be conducted as soon as THWM plan is completed)

## **Lecture Notes**

### **Policy Support**

- ◆ Policy issuances to implement decisions
- ◆ Basis for actions
- ◆ For LGUs: in the form of Ordinances

### **Policy Issuances of LGUs will be based on:**

#### **1. Provisions of existing laws**

- ◆ RA 6969 (Toxic substances and Hazardous and Nuclear Wastes Control Act of 1990)
- ◆ RA 9003 (Ecological Solid Waste Management Act of 2000)
- ◆ RA 8749 (Philippine Clean Air Act of 1999)
- ◆ RA 9275 (Philippine Clean Water Act of 2002)
- ◆ RA 7160 (Local Government code of 1991)

#### **2. THW Management Plan of the LGU**

##### **Ordinances**

- ◆ Law enacted by a local legislative council that is public, governmental, and more or less permanent in character
- ◆ Local law enacted by the legislative body of an LGU, the application of which is limited to the territorial jurisdiction of the LGU enacting it
- ◆ Laws passed by the governing body of a municipality corporation for the regulation of the affairs of the corporation. It is a local law of the particular corporation made for its internal practice and good government

##### **Authority to Enact Ordinances**

- ◆ LGUs are empowered to enact ordinances for the purposes indicated in the Local Government Code
- ◆ LGUs are expressly vested with the police power under what is known as the General Welfare Clause which is embodied in Section 16 of the Local Government Code
  - Sec. 16 – General Welfare – Every LGU shall exercise :
    - Powers expressly granted;
    - Those necessarily implied there from;
    - Powers necessary, appropriate or incidental for its efficient and effective governance; and
    - Those which are essential to the promotion of the general welfare
  - Sec. 16. – General Welfare – Within their respective territorial jurisdictions, LGUs shall :
    - Ensure and support, among other things, the preservation and enrichment of culture;
    - Promote health and safety
    - Enhance the right of the people to a balanced ecology;
    - Encourage and support the development of appropriate and self-reliant scientific and technological capabilities
    - Improve public morals;
    - Enhance economic prosperity and social justice
    - Promote full employment among their residents;
    - Maintain peace and order; and
    - Preserve the comfort and convenience of their inhabitants

## **Authority to Enact Ordinances for Health Care Waste**

### **For Municipalities:**

Sec. 447. – Powers, Duties, functions and Compensation.

- a) The Sangguniang Bayan, as the legislative body of the municipality, shall enact ordinances, approve resolutions and appropriate funds for the general welfare of the municipality and its inhabitants pursuant to Section 16 of this Code and in the proper exercise of the corporate powers of the municipality as provided for under Section 22 of this Code and shall:
  - #4: Regulate activities relative to the use of land, buildings and structures within the municipality in order to promote the general welfare and for said purpose shall:
    - (iii) Regulate the disposal of clinical and other wastes from hospitals, clinics and other similar establishments

### **For Cities:**

Sec. 458. – Powers, Duties, functions and Compensation.

- a) The Sangguniang Bayan, as the legislative body of the city, shall enact ordinances, approve resolutions and appropriate funds for the general welfare of the city and its inhabitants pursuant to Section 16 of this Code and in the proper exercise of the corporate powers of the city as provided for under Section 22 of this Code and shall:
  - #4: Regulate activities relative to the use of land, buildings and structures within the city in order to promote the general welfare and for said purpose shall:
    - (iii) Regulate the disposal of clinical and other wastes from hospitals, clinics and other similar establishments

## **Validity of Ordinances**

To be valid, an ordinance must conform to the following substantive requirements :

- 1) It must not contravene the constitution or any statute.
- 2) It must not be unfair or oppressive.
- 3) It must not be partial or discriminatory.
- 4) It must not prohibit but may regulate trade.
- 5) It must be general and consistent with public policy.
- 6) It must not be unreasonable.

The procedural requirements provided in the Local Government Code must also be complied with.

## **Contents of Ordinances in General**

- ◆ Subject
  - The “WHAT”
  - Acts that are enjoined, required, regulated or prohibited
  - Includes prerequisite acts
- ◆ Scope
  - The “WHO” and/or the “WHERE”
  - Persons, sectors, entities and/or areas covered by the ordinance

- ◆ Procedure
  - The “HOW”
  - The steps or procedure on how to perform the acts that are required
- ◆ Incentives
- ◆ Implementation and Enforcement Mechanisms
  - The process by which the ordinance will be implemented and/or enforced
  - Monitoring
- ◆ Budget
- ◆ Penalty Clause
  - Penalties for violation of the ordinance
- ◆ Amendatory Clause
  - General statement providing that all ordinances inconsistent with the present ordinance are modified, amended or repealed accordingly.
- ◆ Effectivity
  - The “WHEN”
  - Specifies when the ordinance will take effect

## **THWM Ordinance**

### **Contents :**

- ◆ Based on the provisions of existing laws
- ◆ Based on the LGU THWM Plan

### **Recommended Contents of THWM Ordinance**

- I. Objectives
- II. Definition of Terms
- III. Management of Special Wastes
  1. Coverage and scope
    - a) Sources of Special Waste
      - Households
      - Commercial Establishments
      - Industrial Establishments
      - Institutional Establishments
      - Agricultural Establishments
    - b) Activities
      - Storage at source
      - Collection and Transport
      - Processing or Treatment
      - Disposal
  2. Types of waste covered by the ordinance
  3. Requirement/Procedure
    - a) Storage at Source
      - Segregation
      - Receptacles
      - Guidelines contained in the THWM Plan

- b) Collection and Transport
    - Segregated
    - Safety measures
    - Guidelines contained in the THWM Plan
  - c) Processing or Treatment
    - Guidelines contained in the THWM Plan
  - d) Disposal
    - Guidelines contained in the THWM Plan
- IV. Clinical and Other Wastes from Hospitals, Clinics, and other Similar Establishment
1. Coverage and Scope
    - a) Sources (within the territorial jurisdiction of the LGU, both private and public)
      - Hospitals
      - Medical and Dental Clinics
      - Laboratories
      - Medical Research Institute
      - Other Similar Establishments
    - b) Activities
      - Storage at Source
      - Collection and Transport
      - Processing or Treatment
      - Disposal
  2. Types of waste covered by the ordinance
  3. Requirements/Procedure
    - a) Storage at Source
      - Segregation
      - Receptacles
      - Storage Facility
      - Safety Measures
      - Guidelines contained in the THWM Plan
      - Consistent with provisions of applicable laws
    - b) Collection and Transport
      - Safety Measures
      - Guidelines contained in the THWM Plan
      - Consistent with provisions of applicable laws
    - c) Treatment
      - Guidelines contained in the THWM Plan
      - Consistent with provisions of applicable laws
    - d) Disposal
      - Guidelines contained in the THWM Plan
      - Consistent with provisions of applicable laws
- V. Incentives
- VI. Implementation and Enforcement
- ◆ Mechanics
  - ◆ Monitoring
  - ◆ Responsibility Centers
- VII. Institutional Arrangements
- ◆ Authorizing the execution of appropriate agreements between the LGU, represented by the LCE and concerned national agencies for the effective implementation and enforcement of the ordinance
- VIII. Penalties for Violation
- IX. Budget

## **Part 4B**

### **Formulation of THWM Advocacy and Information Education (IEC) Component**

This session provides a review of the communication process and concepts. It presents the different communication tools commonly used in local advocacy /IEC, and puts premium on the role of communication in promoting behavior change, networking and constituency building. It emphasizes the need to have a research based communication plan, requiring a baseline and endline research. It shares some knowledge and skills of participants on the development of creative IEC materials to help them come up with their own IEC plan. Emphasis is made on this component, considering that by its very nature, THW pose a significant hazard to health and the environment, thus precautionary measures in handling THW is a must. There will also be a lecture input on crisis communication as by its very nature, mishandling of THW can lead to a crisis/ disaster in terms of health and environmental impact.

The approach is a combination of lectures and group exercises such as IEC material critiquing and workshops. Input will be on IEC conceptual framework and analytical tools for planning IEC activities. The workshops will cover evaluation of current IEC activities, development of communication matrix, development of IEC materials, and action planning.

The following should be made available to the participants before the training: the THWM assessment on awareness and practices (Part 3); THWM process (Part 2); proposed policy agenda (Part 4A), and inventory of currently available IEC. Based on these data, a communication plan will be drafted with the ff elements: objectives by target audience; key messages; channel/media; person/s responsible; estimated costs; and performance indicator.

#### **Expected output of Part 4B**

A THWM draft communication plan, sample THWM IEC materials

#### **Participants**

THWM task force/ TWG, LGU public information officers, industry /Health care facility/ hospital health educator, NGO and PO representatives in charge of IEC

#### **Timeframe**

2 days (conducted after the THWM plan drafted)

## Lecture Notes

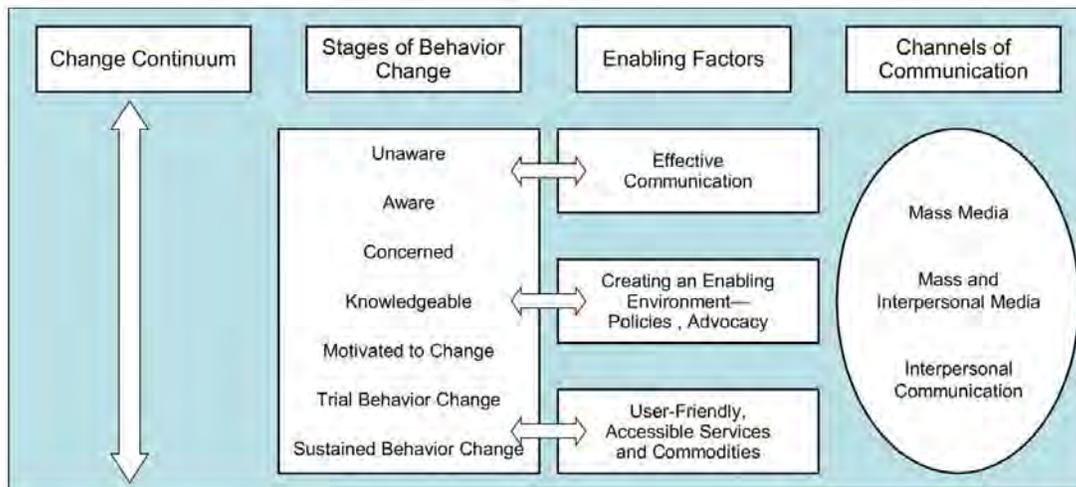
### How do we communicate?

- ◆ We talk to a person or address a group
- ◆ We send out flyers, handouts, brochures
- ◆ We display posters or a billboard
- ◆ We release a story to a newspaper or air a radio message

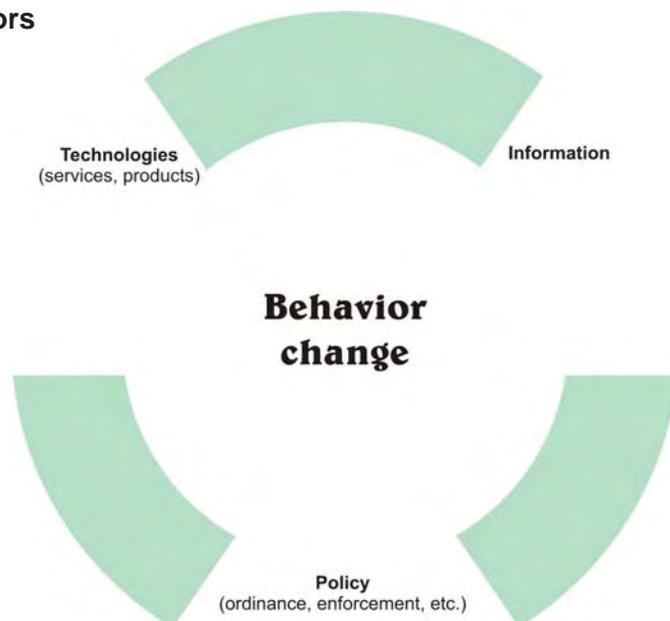
### Why do we need to communicate?

- ◆ We want something to happen
- ◆ When we work on environment and health issues, we usually want some change to take place
- ◆ We hope to cause change in the way people think, and the way they behave – from “bad” to “good” ,from “good” to “better”

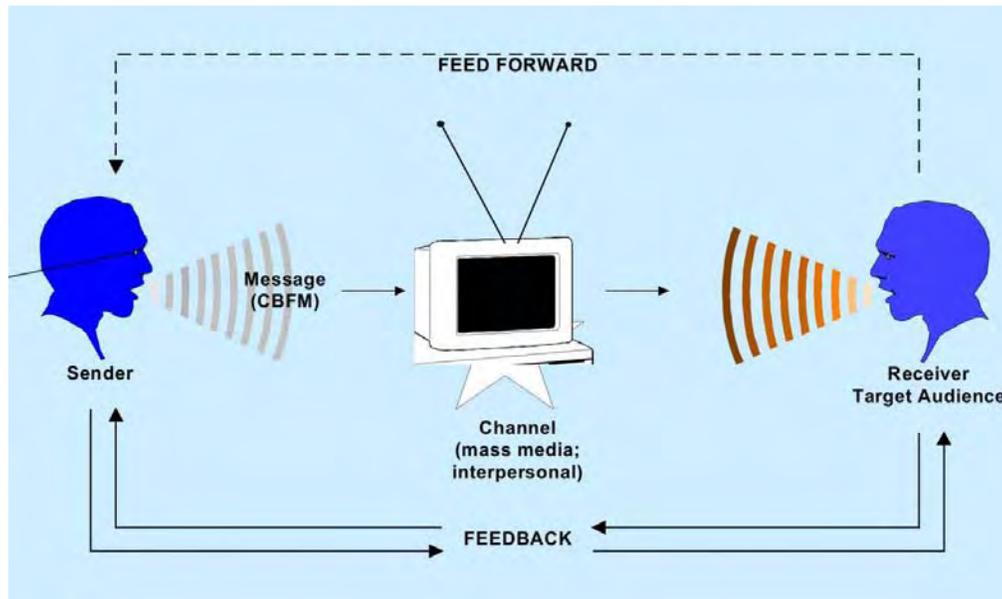
### Behavior Change Process



### Changing Behaviors



## Communication Process



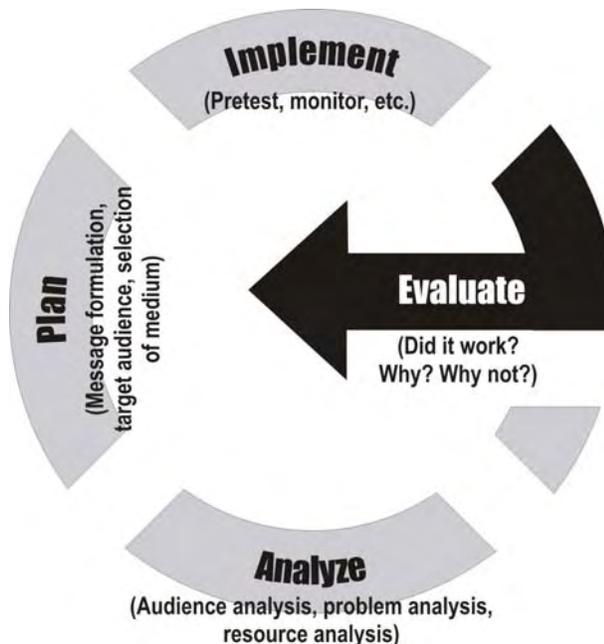
### Message: The heart of every communication activity

No communication strategy, plan, campaign or materials can be effective without any clear or specific messages.

### Audience: No effective message can be developed without first knowing the audience.

For one to be able to deliver a specific message, he/she should first know who to communicate with, so that the message can be formulated to suit the audience's needs.

### The “e” Process



## Message Development Matrix

Key issue/s	Group of stakeholders involved in issue (top 3 only)	Key stakeholders per group (top 3 only)	Specific target audience	Desired behavior (needed info)	Message	Channel

### Step 1. Identify the key issues

- ◆ What are the main issue/s involved in toxic/hazardous waste management? (i.e., THW not handled well at hospital/health care facilities, household, industry, agricultural areas)
- ◆ Which of these issues require immediate attention? (let's focus on immediate concerns)

### Step 2. Identify groups of people involved in key issues/s

- ◆ Which are these groups
  - Personnel (HCWM committee/staff) of institutions (e.g., hospitals)
  - Personnel of commercial and industrial establishments
  - LGU officials (municipal and barangay level)
  - Household members
  - Etc. (e.g., civil society organizations, media)

### Step 3. Identify those whose decision/action is crucial in THW management

- ◆ If hospital personnel, is it the administrator or health workers?
- ◆ If Barangay official, is it the captain? The barangay council members?
- ◆ If municipality/city officials, is it the mayor? SB members?
- ◆ If residents, who and where are they specifically?
- ◆ If industry, is it the TSD facilities?

### Step 4. Analyze the targets

- ◆ Are they aware of the gravity of THW problem? (THW waste assessment data, etc.)?
- ◆ Do they know what has to be done? (THW management strategies/options)
- ◆ Do they know there are (national/local laws)
- ◆ Do they know the danger or the health and environment impact (whether personal or for the community)?
- ◆ Who are possible allies (media, civil society groups, etc.)? Contrabida?
- ◆ Demographic (age, literacy, dialect, religion, etc.)
- ◆ Media habits (Where do they usually get their info? Radio/newspapers/assemblies? Who do they listen to?)

### Step 5. Identify desired behavior/information needs

(i.e., You want heads of household to carefully handle THW in their homes. What info do they need?)

- ◆ Products in their homes that are toxic and hazardous
- ◆ Specific dangers they pose to their families
- ◆ How to handle THW
- ◆ Who contact for help

**Step 6. Develop the message**

- ◆ Remember, message should be able to:
  - Address the issues earlier identified (“handle THW carefully. They are hazardous to health”)
  - Communicate the benefits (“if you handle your THW well, you can avoid health risks,”. Be safe! Try alternative housecleaners”)

**Step 7. Choose channels/products\***

- ◆ Choose channel based on preference of targets (see results of analysis) and, of course, your available resources (if you cannot afford radio, perhaps a public address system will do)
- ◆ Again, based on needs and resources, identify what IEC products are required (Posters? Radio plugs? Flipcharts/presentations? Flyers?)

*\* If you are planning a campaign, all things discussed may be used in preparing a communication plan matrix*

## CRISIS COMMUNICATION

What is a crisis? A major catastrophe that may occur either:

- ◆ **Naturally** (i.e., landslides, typhoons)
- ◆ **Or as a result of human error** (i.e., oil spills, mishandling of toxic/hazardous waste, miscalculation/mishandling of issues causing loss of organization's credibility)

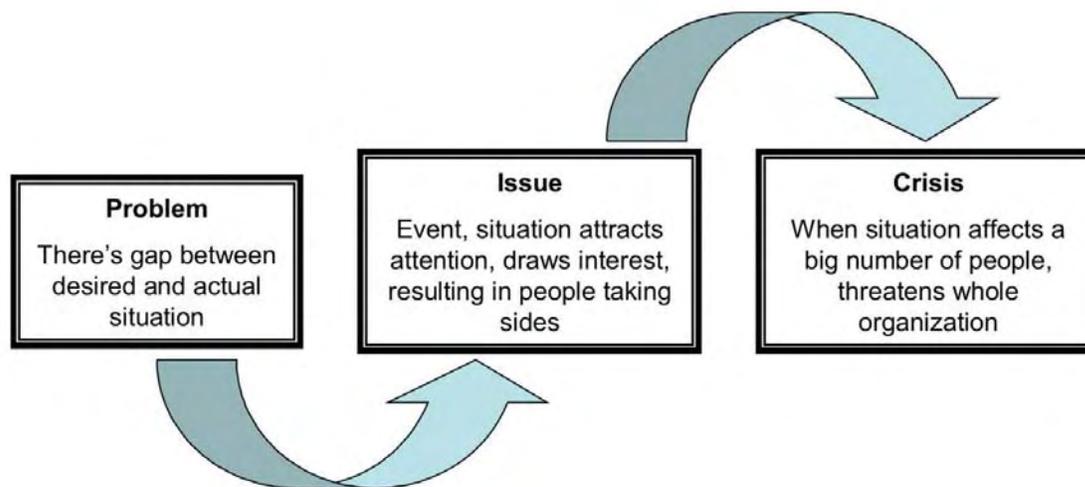
What are the characteristics of a crisis?

- ◆ Happens at inconvenient, unexpected times (surprise!)
- ◆ Occurs rapidly
- ◆ Generates attention; intense scrutiny by media, interest groups (usually accompanied by strong negative public opinion)
- ◆ Can cause breakdown in communication
- ◆ Can severely dislocate services (as it threatens institutions, programs)
- ◆ Can cause severe image/identity problem
- ◆ Can immobilize, cause unrest
- ◆ Has potential to become worse

What are the examples/forms of crisis?

- ◆ Natural calamities (earthquake), environmental disasters (nuclear leaks, oil spills, mishandling THW), health disasters (epidemic)
- ◆ Product problems (e.g., product recall)
- ◆ Allegations of mismanagement (e.g., lack of transparency in handling of government funds)
- ◆ Community resistance (e.g., resistance to MRF site?)

Focusing on man-dame crisis: **How does it develop?**



How do we plan for a crisis?

Crises cannot be predicted with certainty, but it can be anticipated:

- ◆ **If a problem exists** (i.e., hospital wastes accidentally dumped in creek), **keep careful watch** (were there people being affected? Fish/animals dying? Etc.) **The earlier it is detected, the better.**
- ◆ **Don't wait for the issue to explode out of control. Decide what to do; act swiftly** (Do you immediately issue a warning that may cause unnecessary panic? Do you first "try" to remedy the problem before making an announcement?)
- ◆ **Prepare information ahead of time** (anticipate possible questions; provide answers to questions than people may have but may often not express)
- ◆ **Imagine the worst**
- ◆ Have a crisis communication plan

What should be considered in the plan?

- ◆ **Forming a crisis communication team**
- ◆ **Appointing a spokesperson** (who will face media, for a, assemblies – choose the most credible, one whom people trust)
- ◆ **Providing concerned employees with relevant info** (to ensure that you will speak with one voice)
- ◆ **Deciding on your main message** (to ensure consistency – "Dumping was accidental," "Everything is being done to prevent health problems.")
- ◆ **Organizing relevant facts/data.**
- ◆ **Preparing information materials** (e.g., leaflets, flipcharts) **& activities** (meetings press cons)
- ◆ **Expanding your list of allies** (business & religious groups, SBs, media, etc.) and providing them with relevant info
- ◆ **Knowing the opposition** (Who is their leader?) What is their main motive/interests? Etc.)

What do we have to remember?

- ◆ Respond quickly. If something is wrong, tell it all, tell it fast. Be slow in blaming others.
- ◆ Be consistent. Speak with one voice. Remember to have a spokesperson. This person should show he/she is in control. Pick one who is credible and sensible.
- ◆ Isolate the crisis. If it is about the "accidental dumping of THW in creek", limit it to that.
- ◆ Don't leave any room for people (media) to speculate. **Adopt an open communication policy.** Don't lie. A candidly told story is less damaging than a cover-up version.
- ◆ Know your allies; ask them to publicly support you.
- ◆ When answering questions, be concise, no unnecessary statements.

*The best thing to do? Avoid a crisis! Monitor situations and don't let issues develop into crises.*

**Part 4C:**  
**Engineering, Technology Options and Possible Investments**

A technical input on engineering and technology options (both onsite and offsite) will be made. It is important that the LGU participants will have the HCW assessment and waste characterization data as this will be the basis for consensus and decisions on waste minimization, segregation, storage areas, on site collection carts or trolleys, the design of proposed treatment (biological, chemical, mechanical, thermal, use of needle destroyers and other nonburn technologies) and disposal technologies (encapsulation, inertization, safe burial, septic/concrete vault, sanitary landfill) and for the procurement of some equipment such as receptacles (for biodegradable, recyclables, sharps, infectious and pathological waste, other THW, residuals) and color coded bags. Off site collection of general or domestic waste from the health care facility should also be decided upon. Policies will have to be agreed upon such as waste reduction and recycling “purchasing policy” and what to do with biodegradable waste from the kitchen and left over from the patients.

**Expected Output:**

Engineering and technology options

**Participants:**

ESWM board, PENRO/CENRO, City Health Officer/ Municipal health Officer, LGU Budget/ Planning Officer waste generators, waste treaters

**Timeframe:**

Two months for the LGUs to discuss and decide on options

## **Lecture Notes**

- ◆ Waste collection and off site transport - Proper packaging and labeling, requirements for transporters such as consignment note, specifications for transport vehicle, registration with EMB
- ◆ Waste labeling for off site transport: date of production, place of production, waste quantity, waste category, waste destination, UN symbol and class
- ◆ Aims of Treatment and Disposal: limit public health and environment impact
- ◆ Criteria for selection of technology: treatment efficiency, volume and mass reduction, quantity and type of waste, infrastructure, availability, training, investment, social and political acceptability, occupational health and safety, regulatory requirements
- ◆ Treatment options onsite and off site: needle destroyers, biological, chemical disinfection (chlorine, formaldehyde, Na hypochlorite, phenolic compounds, wet and dry thermal treatment (autoclave, hydroclave, and microwave), radiation technology
- ◆ Waste disposal systems-, encapsulation, inertization for treated waste: safe burial in hospital premises, septic/ concrete vault, sanitary landfill; consider hospital networking
- ◆ Advantages and disadvantages of different treatment and disposal technologies - elaborate
- ◆ Overview of disposal and treatment methods suitable for health-care waste categories

Wastewater treatment- use of a sewer, primary treatment, secondary biological purification, tertiary treatment, chlorine disinfection, on-site and off-site sludge treatment

### **Engineering: Treatment and Disposal Options**

Aim of treatment and disposal: Limit public health and environment impacts by:

- ◆ Transforming the waste into non-hazardous residues by treatment
- ◆ Containing the waste/residues to avoid human exposure
- ◆ Containing the waste/residue to avoid dispersion into the environment

### **Treatment Technologies Selection Criteria**

- ◆ Treatment efficiency
- ◆ Volume and mass reduction
- ◆ Capacity of system/quantity of waste
- ◆ Type of waste
- ◆ Infrastructure requirement/available space
- ◆ Availability of technology equipment
- ◆ Training requirement
- ◆ Investment, operation and maintenance
- ◆ Social and political acceptability
- ◆ Occupational Health and Safety
- ◆ Regulatory requirements – CAA, TSHNW, LGC
- ◆ Options for final disposal

#### **4.C.1. Types of Treatment Technologies**

- Needle destroyers
- Chemical Disinfection
- Wet and dry thermal treatment
- Biological process (composting)
- Radiation Technology

Advantages and disadvantages of different treatment technologies:

**a. Chemical disinfection** (chlorine, formaldehyde, Na hypochlorite, phenolic compounds)

- Treating blood, urine, stool and sewage
- Treating infectious waste containing pathogens
- Chemotherapy waste
- Requires shredding of waste
- May introduce strong chemicals into the environment

**b. Wet thermal treatment systems** - Method that exposes waste to steam under pressure, examples: autoclave, microwave, hydroclave.

Characteristics :

- Low investment and operating costs for simple apparatus
- Environmentally friendly
- Not appropriate for tissue or carcasses
- Trained operators required

**Autoclave** - waste exposed to steam under pressure

### Hydroclave

The Hydroclave Process

- Stage 1: Loading
- Stage 2: Fragmentation and Sterilization
- Stage 3: Venting and Dehydration
- Stage 4: Unloading

### Microwave

- Widely used as disinfection process
- Inappropriate for treatment of anatomical waste and animal carcasses
- Inefficient treatment for chemical or pharmaceutical waste
- Efficiency should be routinely checked through bacteriological and virological tests
- Microbiological inactivation by heat conduction and radiation

**c. Thermal Decomposer System**

- 10-ton per day Treatment Facility
- Three stage process
  - First Stage: Thermal destruction of wastes
  - Second Stage: Thermal destruction of flue gas
  - Third Stage: Scrubber System
- Primary Chamber: **1<sup>st</sup> Stage**
  - Two-5 ton primary (destruction) chamber
  - Batch loading process
  - Fire does not have direct contact on wastes during heat-up
  - Maximum temp. ~ 1000 °C
  - Wastes are **heated, dried and decomposed**
- Secondary Chamber: **2<sup>nd</sup> Stage** (after burner)
  - Where gases from the primary chamber undergo combustion.
    - √ Thermal destruction of pollutants (fumes).
  - Maximum operating temp. ~ 1200 °C
  - Flue gas retention time ~ **2.5 seconds**

- Scrubber System: **3<sup>rd</sup> Stage**
  - Flue gas passes through a wet-scrubber to further eliminate pollutants.
    - √ Particulate, acids, others

#### **4.C.2. Waste Disposal System - Can be On-Site or Off-Site**

- ◆ Sanitary landfill
- ◆ Encapsulation
- ◆ Inertization
- ◆ Safe burying on hospital premises
- ◆ Septic/Concrete vault

##### **a. Sanitary Landfill**

An engineered method designed to keep the waste isolated from the environment.

##### **b. Encapsulation**

Involves the filling up of containers with waste, adding and immobilizing material and sealing the containers. The main advantage of the process is that it is very effective in reducing the risk of scavengers gaining access to the health care waste.

- Fill metal or plastic container to  $\frac{3}{4}$  with water and fill with sand or clay
- For sharps, chemical, drugs

##### **c. Inertization**

- Suitable for pharmaceutical waste, involves mixing of waste with cement, water
- Limit for chemical and pharmaceutical wastes and other substances before disposal
- This minimizes the risks of toxic substances contained in the waste migrating into surface water or groundwater.

##### **Process of Inertization of Pharmaceutical Waste**

- Remove packaging
- Grind the pharmaceutical
- Add mixture: proportion should be
  - √ 65% pharmaceutical waste
  - √ 15% lime
  - √ 15% cement
  - √ 5% water
- Dispose in landfill

##### **d. Safe Burial on Hospital Premises**

- Lined with impermeable material
- Each deposit covered with soil
- Avoid groundwater pollution

##### **Safe Burial**

- Safe Burial on Health Care Premises
  - √ In remote location and rural areas the most viable option is the safe burial of waste on healthcare premises
  - √ Designated place
  - √ Limit access
  - √ Bury waste rapidly
  - √ Put proper signage

### Summary of main advantages and disadvantages of THW treatment and disposal options

Treatment/Disposal	Advantages	Disadvantages
Pyrolytic Incineration	Adequate for all infectious waste, chemical and pharmaceutical waste	Destruction of cytotoxics not complete; Relatively high costs of investment and operation.
Chemical disinfection	Highly efficient disinfection; some chemical disinfectants are relatively inexpensive; drastic reduction in waste volume	Requirement of a highly qualified technicians for operation of the process; Use of hazardous substances which require comprehensive safety measures; inadequate for pharmaceutical, chemical and some types of infectious waste; not for human use
Wet Thermal Treatment	Environmentally friendly; Drastic reduction in waste volume; Relatively low investment and operation cost	Shredding are subjected to many breakdowns and bad functioning; Operation requires qualified technician; Inadequate for anatomic waste, pharmaceutical and chemical waste or waste which are not easily penetrable by steam
Microwave irradiation	Good disinfection efficiency under appropriate operational conditions; Drastic reduction in waste volume; Environmentally friendly.	Relatively high investment and operation cost; potential operation and maintenance problems; routine microbiological-testing
Encapsulation	Simple and safe in metal containers which are sealed; Low costs; May also be applied to pharmaceutical, chemicals, heavy metals.	Not recommended for non-sharp infectious waste, such as infectious waste
Safe burying	Low costs; Relatively safe if access restricted and where natural infiltration is limited, e.g., pharmaceuticals, chemicals.	Only safe if access to site is limited and some precaution taken; Potential groundwater pollution
Inertization (cementation)	Relatively inexpensive, e.g., pharmaceutical, chemicals	Not applicable to infectious waste

**Overview of disposal and treatment methods suitable for Health Care Waste categories**

<b>Technology or method</b>	<b>Infectious Waste</b>	<b>Anatomic Waste</b>	<b>Pharmaceutical Waste</b>	<b>Sharp</b>	<b>Cytotoxic Waste</b>	<b>Chemical Waste</b>	<b>Radioactive Waste</b>	<b>Waste with Heavy Metal</b>
Pyrolytic incineration	Yes	Yes	Yes	Small quantities	No	Small quantities	Low-level infectious waste	No
Chemical disinfection	Yes	No	Yes	No	No	No	No	No
Wet Thermal Treatment (autoclave)	Yes	No	Yes	No	No	No	No	No
Microwave irradiation	Yes	No	Yes	No	No	No	No	No
Encapsulation	No	No	Yes	Yes	Small quantities	Small quantities	No	Yes
Safe burying inside premises	Yes	Yes	Yes	Small quantities	No	Small quantities	No	No
Sanitary Landfill	Yes	No	No	Small quantities	No	No	No	No
Inertization	No	No	No	Yes	Yes	No	No	No
Other methods				Return expired drugs to supplier	Return expired drugs to supplier	Return unused chemicals to supplier	Decay by storage	
Others					Landfill not recommended	Chemical degradation	No disposal to sewer	

**Part 4D:**  
**Monitoring Compliance and Institutional Arrangements**

This part will guide the participants in reviewing and crafting of institutional and management arrangements for monitoring THWM plan implementation in the LGU. It will present organizational arrangements that are currently being used by LGUs, such as the mechanism whereby the Health care waste management committee will interface and work with the LGU ESWM board in achieving the same goals and objectives. The various activities that go into the organizational plan will be discussed. It will be helpful to have a copy of the LGU current organization and staffing pattern. This session will emphasize the monitoring and regulatory role of the LGU, the EMB, as well as the DOH.

This session will also emphasize the critical role of monitoring and evaluation in ISWM- THW plan management and how this is linked with TAP principles. A monitoring checklist will be developed, with key indicators for the various components of ISWM THWM plan. Discussion on how data will be gathered, tracked, analyzed for decision makers will complete the development of the monitoring and evaluation system

**Expected Output:**

LGU SWM organization and its linkages with the HCWM committee, other LGUs interested to share treatment and disposal facilities, and with other external bodies or the private sector ; THWM monitoring/ evaluation plan

**Participants:**

ESWM board, HCWM committee; Representatives from LGU planning, budget, health personnel offices; DOH, DENR, EMB representatives

**Timeframe:**

2 days

**Lecture Notes**  
**THWM Compliance Monitoring**

**Importance:**

- ◆ Determine compliance with the THWM Plan
- ◆ Determine compliance with the THWM Ordinance
- ◆ Basis for imposition of fines/penalties
- ◆ Identify Good Practices
- ◆ Identify Gaps, Issues, and Constraints
- ◆ Basis for subsequent actions and decisions
  - New strategies
  - Modification or revision of THWM Plan
  - Additional Support
    - Budget
    - Manpower
    - Logistics

**Minimum Requirements**

- ◆ Organization or Office
  - Personnel
  - Logistics
- ◆ Monitoring System
  - Entry and Inspection
- ◆ Reporting System
- ◆ Budget

**Coverage**

1. Sources
  - Special Waste
  - Toxic and hazardous Waste: Health Care Waste (HCW)
2. Activities
  - Storage
  - Collection and Transport
  - Treatment or Processing
  - Disposal

For activities:

1. Compliance with requirement and parameters set forth in the THWM Ordinance
  - What are the requirements and parameters?
  - Are these being complied with?

**Sample Checklist**

***For Hospitals / HEALTH CARE FACILITIES***

1. Organization and Planning
  - ◆ Is there an organized HCWM committee?
  - ◆ Is there an updated HCWM Plan?

2. Waste Minimization
  - ◆ Is there a policy on waste minimization?
  - ◆ Is waste reduction being practiced?
  - ◆ Is re-use being practiced?
  - ◆ Is recycling being practiced?
3. Segregation
  - ◆ Is segregation being implemented?
  - ◆ Is safe packaging and adequate labeling of waste being practiced?
  - ◆ Are appropriate receptacles provided?
4. Storage
  - ◆ Is there a designated storage facility in the premises?
  - ◆ Is it properly marked with signage/warning signs?
  - ◆ Does it have water supply and drainage?
  - ◆ Is it well maintained?
5. Waste Treatment (on-site)
  - ◆ Is waste treatment being implemented?
  - ◆ What are the methods of waste treatment?
6. Waste Treatment (off-site)
  - ◆ Is waste treatment being implemented?
  - ◆ What are the methods of waste treatment?
7. Collection and Transport (on-site)
  - ◆ What is the frequency of collection?
  - ◆ What equipment is being used for collection?
  - ◆ Does the equipment have sharp edges?
8. Collection and Transport (off-site)
  - ◆ What is the frequency of collection?
  - ◆ Who does the collection and transport
  - ◆ Is it a DENR-accredited transporter or carrier?
  - ◆ What type of equipment is used for transport?
9. Disposal
  - ◆ What type of disposal facility is being used?
  - ◆ Who owns the disposal facility?
  - ◆ Is the disposal facility well maintained?
  - ◆ What are the safety measures present?
10. Health and Safety practices
  - ◆ Are waste handlers/workers provided with appropriate Personal Protective Equipment?
  - ◆ Are waste handlers/workers given immunization regularly?

**Lecture Notes**  
***Institutional Arrangements for THWM***

**Objectives of Institutional Arrangements:**

- ◆ More effective implementation of the THWM Plan of the LGU
- ◆ More effective implementation and enforcement of the THWM Ordinance of the LGU

**Areas to be covered in Institutional Arrangements:**

- ◆ Ordinance Formulation and Enforcement
- ◆ Training and IEC
- ◆ Compliance Monitoring of THW Generators
- ◆ Engineering and Investments

**Questions to be addressed:**

1. In addition to the LGU, what other agencies or groups will be involved in the activity?
  - National Government Agencies?
  - Regional, Provincial, City, Municipal Government Agencies?
  - Private Institutions?
  - NGOs?
  - Communities?
  - Waste Generators?
  - Waste Treaters?
  - Landfill Operators?
2. What will be the role of?
  - LGU
  - Other PartnersWho will take the lead?
3. Are there existing agreements between the LGU and the other agencies or groups?
  - If yes, are the current arrangements effective/working?
  - Can the existing agreements be used? Improved?
4. Are there existing multi-agency bodies that are performing similar functions?
  - If yes, can this be tapped?
  - Can their mandate be expanded?
  - Can it be restructured to include the specific THWM activity?
5. Will this activity require budget allocation?
  - Who will provide the budget?
6. Will the activity generate revenue for the LGU/Agency?
  - How will the revenue be used?
7. How should the Institutional Arrangements be formalized?
  - MOAs?
8. Incorporation of the principles of Transparency/Accountability and Participatory Decision-Making in the Institutional Arrangements?

## **Part 4E: THWM Costs and Financing Options**

This component is essential for the LGUs and waste generators/ treaters to understand the costs and benefits of compliance to the national laws in the planning of THW management. According to the “Polluter Pays” principle, each health care facility should “pay” for the safe treatment and disposal of the waste it generates. An understanding of the waste management hierarchy is necessary to cut cost at each level. Proper segregation for example, will significantly reduce the quantities of hazardous waste requiring special handling, treatment and disposal. The external and internal costs of health care waste management will have to be considered by waste generators. The benefits of proper THW management will be presented. A cost reduction checklist will be provided

The LGU and waste generators/ treaters will be guided to assess its capability to finance plan implementation and to identify the extent of external financing required over the plan period. LGUs and waste generators / treaters will be provided financing options to set up on site or off site non-burn treatment facilities. Advantages and disadvantages will be presented on the use of private waste management services.

It is important that the participants have data on the waste generation rate per bed per day (Part 3) and a cost estimate per HCWM stage to draft the financing plan.

### **Expected Output:**

A cost reduction checklist for every stage of the HCWM system;  
a financing plan

### **Participants:**

health care waste management committee, LGU representatives of its administration, finance, personnel and planning units

### **Timeframe:**

2 days (if possible while drafting HCWM plan)

**Lecture Notes**  
**Costs and Financing HCWM plan**

- ◆ “Polluter Pays principle” requires THW generator to pay for its treatment and disposal
- ◆ Cost reduction could be achieved through minimization, proper segregation and recycling of waste and through appropriate sizing of the waste management system
- ◆ Future trends in waste production and legislation becoming more stringent, should be anticipated
  
- ◆ **2 types of costs (Compliance to THW laws increase costs to LGUs and facility)**
  - Internal costs - costs relative to segregation, packaging, on-site handling, costs of supplies and labor
  - External costs - costs relative to off-site transport and treatment, and final disposal which are paid to contractors who provide for the service

**Total costs of a waste management system:**

- ◆ Initial capital investments- purchase of equipment
- ◆ Amortization of plant and equipment- over life time equipment
- ◆ Operating costs- costs of labor and consumables
- ◆ Contractual costs- for external services such as transportation and final disposal

**Methods of Financing:**

- ◆ Public/government funding of investments- compulsory use of public/ government facilities
- ◆ Private funding of investments- choice of private facilities and services
- ◆ Funding of investments by health care establishments- cooperation between lgus and establishments to use a common facility ( i. e., non burn technology)

**Use of Private Services ( Decentralized Treatment)**

- ◆ Advantages: Inability of health care establishments to raise needed capital; expected greater efficiency than public facilities; transfer risk of operation
- ◆ Disadvantages: Potential loss of control by the public agency; may result in minimum level of services provided; regular inspection and regulatory control required

**Use of Contractual Services**

Any agreement with private companies should include the following points: prescribe minimal levels of service (reliability, safety, public health risks, expansion); method of dealing with cost increases ( inflation, etc); environmental concerns; transfer of ownership; quality and regulatory control

**Cost Reduction Checklist**

- ◆ On site waste management practices- waste segregation, minimization and recycling;
- ◆ Purchasing policy and stock management; comprehensive planning (consider LGU clustering of services); Cost accounting and control; Choose adequate methods and technologies; Training of personnel for efficient and safe implementation

**Costs of Construction and Operation of a Health Care Waste Treatment Plant**

- ◆ Site- costs of land, rights of way
- ◆ Consultancy fees- environmental/ waste management consultant, engineering, architectural, legal fees
- ◆ Construction costs- building, waste storage room, offices
- ◆ Equipment-cost of equipment (autoclave, microwave); freight and storage charges
- ◆ Waste Transport costs- waste collection trucks, bins/containers for transporting waste from hospitals to incinerator site

- ◆ Equipment costs- Trolleys for collecting waste bags from wards, bag holders to be located at all sources of waste arising in the hospitals, weighing machines for weighing waste bags, refrigerators for storage, if necessary
- ◆ Financing charges- interest, taxes, accounting and audit fees
- ◆ Direct operating costs- manpower requirements (manager, operators, drivers), yellow bags with labels for infectious waste, black bag for general/ recyclable waste, green bags for biodegradable waste, sharp containers, transportation costs, utilities ( water, electricity), chemicals ( for flue gas cleaning)
- ◆ Indirect operating costs- training, equipment maintenance, vehicle maintenance and parts replacement, vehicle maintenance, uniforms and safety equipment, compliance monitoring, microbiological testing, project management and administrative costs to the organization responsible for the execution and long term operation of the project

### Privately Owned Treatment/Disposal Facilities: Comparative Costs

HCW Facility Owner/Service Provider	Approximate Capacity	Type of Treatment	Cost of Collection, Treatment and Disposal (P/kg)
St. Luke's Medical Center	330 kg/hr	Steam autoclave	Exclusive use of St. Luke
CES	250-400 kg/hr	Microwave	
IWMI	10 tons/day	Pyrolysis	
PAE, PASS CLEANWAY	2000 kg/day	Autoclave Hydroclave	

## **Part 4F: HCWM Organizational/ Administrative Component**

The objective of this session is to define the structure, staffing, and functions of an ideal health care waste management committee that will oversee HCWM plan implementation in the health care facility. This will guide the LGU in the institutional arrangements in the monitoring of THWM, health care facilities being a major source of THW. This will familiarize the LGU on the role of the on site HCWM committee in the implementation of the on site HCWM plan, thereby, will have an idea of the onsite monitoring of the HCWM plan implementation. A technical input will also be provided on other administrative requirements of the HCWM plan such as provisions of health and safety guidelines for health care workers, record keeping and information system, emergency preparedness and response as well as plans for training the personnel.

The activity will entail organizational meetings, to be facilitated by a resource person skilled on organizing and planning other administrative components of the HCWM plan.

### **Expected Output:**

An HCWM committee organizational structure, manpower complement, and functions; Health and safety guidelines, plan for emergency response, and plan for record keeping

### **Participants:**

Health care facility/hospital director/ chief, heads of housekeeping, motor pool, maintenance, infection control officer, radiation officer, senior nursing staff, pharmacist, financial controller, engineer, health educator, waste management officer; LGU SB/SP committee on health

### **Timeframe:**

2 days (could be done simultaneous while drafting THWM plan)

**Lecture Notes**  
**On site HCWM Organizational and Administrative component**

**Creation of a Health Care Waste Management Committee (HCWM Committee)** with suggested composition:

Chief/ Director of the health care facility- Chairperson, Waste Management Officer, Department Heads, Infection Control Officer, Chief Pharmacist, Radiation Officer, Senior Nursing Staff, Hospital Engineer/ head of Environment Services, Financial Controller, Health Educator/ Information Officer

**Functions of the HCWM Committee:**

In the facility: functions to formulate a policy formalizing the commitment of health care institution, establish baseline data and develop the facility's HWWM plan, implement monitor and evaluate the HCWM plan, ensures adequacy of financial and human resources

**Duties of the Waste Management Officer (WMO)**

- ◆ Control internal waste collection;
- ◆ Ensure correct storage;
- ◆ Coordinate disposal storage;
- ◆ Monitor onsite and offsite transport of waste;
- ◆ Liaise with department heads to ensure training is carried out;
- ◆ Monitor waste generation, storage, disposal, costs, and public health aspects ( e.g., injuries) of waste

**Duties of other Key Staff:**

- ◆ Department Heads, Senior Nursing Officer, Infection Control Officer- contribute to training and implementation of correct procedures
- ◆ Chief Pharmacist, Radiation Officer, Supply Officer- same duties as above and responsible for the sound management of stores
- ◆ Hospital Engineer- same as above and responsible for installing and maintaining storage facilities and handling equipment

**Establishment of record keeping and information system**

- ◆ Collection of data: volume of waste generated, Facility HCWM practices

**Health and Safety Practices/ Measures in Handling THW for Workers**

- ◆ Physical examination, personal hygiene, safety procedures, provision and proper use of personnel protective equipment (PPE)
- ◆ Health examinations: entrance or pre-employment, periodic or annual exam, special exam (lung function, virology test), immunization (hepatitis B, tetanus toxoid)
- ◆ Personal hygiene practices: regular bath, wearing of PPEs, frequent hand washing
- ◆ Types of PPE: Hard hat with or without visor, eye protector or goggles, coveralls or aprons, safety boots/shoes and leg protectors, heavy duty gloves (waste workers) or disposal gloves for medical staff

**Emergency preparedness and accident management**

- ◆ Immediate first aid measures; immediate reporting; identify source of injury; maintain medical surveillance; blood tests if required; record the incident in full; investigate the causes and report; implement prevention measures to avoid similar incidents
- ◆ Clean contaminated areas and disinfect if necessary
- ◆ Limit exposure of workers; limit impact on patients, personnel, and environment

### **Procedure for spillage cleaning**

- ◆ Evacuate the area;
- ◆ Decontaminate eyes and skin;
- ◆ Inform designated person;
- ◆ Determine nature of spill;
- ◆ Provide first aid and protective clothing;
- ◆ Neutralize or disinfect;
- ◆ Decontaminate and rinse area;
- ◆ Seek medical care where necessary

### **Plans for training facility/ hospital personnel**

# Part 5

## LGU Actions Planning

**T**ith the guide and results of the waste assessment, LGUs should draw up and evaluate alternative strategies, choose the preferred option, and come up with the proposed activities/ interventions for the plan period,. During this last part of the THWM training orientation, the participants would be ready to draft a THWM plan with the components outlined in part 4. This THWM plan could be integral to the legitimized ISWM plan or as part of the ISWM planning process for target LGUs. A suggested matrix for a THWM plan, stating components, strategies, and possible activities is in **Annex 9**.

**VII Time Frame for THW Training Orientation for all 5 parts will cover 3 full days**