

**National Policies**



**“DEMONSTRATING AND PROMOTING BEST TECHNIQUES AND PRACTICES FOR REDUCING HEALTHCARE WASTE TO AVOID ENVIRONMENTAL RELEASE OF DIOXINS AND MERCURY” PROJECT**

**REPORT ON  
REVIEW OF HEALTHCARE WASTE MANAGEMENT  
RELATING POLICIES AND RECOMMENDATIONS  
(COMPONENT VI)**

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## ACRONYMS

HCW	Healthcare waste
HCWM	Healthcare waste management
H <sub>z</sub> HCW	Hazardous healthcare waste
H <sub>z</sub> W	Hazardous waste
H <sub>z</sub> WM	Hazardous waste management
MoH	Ministry of Health
MoNRE	Ministry of Natural Resource and Environment
MoC	Ministry of Construction
PPE	Personal Protective Equipment
QCVN	National technical regulation
TCXDVN	Vietnam construction standard
TCVN	Vietnam standard
WHO	World Health Organization

## **1. INTRODUCTION**

“Demonstrating and promoting best techniques and practices for reducing Health care waste to avoid environmental releases of dioxins and mercury” project is funded by Global Environmental Facility through UNDP development program and has been implemented by Ministry of Environment and Natural Resource since October 2009. The overall goal of this project is to protect public health and the global environment from the impacts of dioxin and mercury releases. The project contributes to implementation of National action plan for Stockholm Convention on persistent organic pollutants. To achieve this, the project is demonstrating best environmental practices and best available technologies at healthcare facilities that have been selected to serve as models within seven countries.

In Việt Nam, the project include the following activities: establish model facilities and programs to exemplify best practices in healthcare waste management; deploy and evaluate commercially available, non-incineration healthcare waste treatment technologies appropriate to the needs of Vietnam; introduce the use of mercury-free devices in model facilities; establish or enhance training programs to build capacity for the implementation of best practices and technologies both within and beyond the model facilities and programs; review relevant national policies related to healthcare waste management; disseminate project results to promote best techniques and practices for reducing Health care waste to avoid environmental releases of dioxins and mercury. This report is the result of component of review reviewing HCWM related policies.

## **2. NECESSITY**

Improvement of healthcare waste management (HCWM) is an important public health and environmental policy objective in Vietnam. In 2010, Vietnam has 1186 hospitals with capacity of 187843 patient beds. The hospitals are generating 0,2 kg of solid hazardous waste per bed per day and 0,5–0,8 m<sup>3</sup> of wastewater per bed per day in average depending on the size and service provision. It is estimated that only 50% of these hospitals segregate and collect healthcare waste according to regulations. Incineration is most common method of HCW treatment in Vietnam. More than 485 incinerators are installed in nationwide, 44% of those need to be replaced or upgraded. Some sampling studies on quality of gas emission from HCW incinerators showed that HCW incinerators caused pollution of ambient air, concentration of dioxin in gas emission exceeded allowable limit. 59% of hospitals have wastewater treatment plants, but only 29% of those are well operated. A survey conducted by National Institute of Occupational and Environmental Health revealed that only 6% of existing wastewater treatment plant meet all parameters regulated in Vietnam standard on hospital wastewater quality.

There has been significant media coverage on improper medical waste management practices and complains of communities. These concerns led to questions on HCWM at National Assembly and responses of stakeholders with a sound legal framework, an aggressive investment plan, and an emphasis on improving local services, especially in major cities. Achieving the goal of safe and cost-effective management and disposal of waste is a major challenge, requiring concerted efforts by government, industries, hospitals, solid waste operators, and individuals. Improvement of policy is considered as an important solution.

### **3. OBJECTIVES**

The objectives of the report are:

- To identify weaknesses in legal documents relating to HCWM;
- To provide recommendations for improvement of HCWM relevant policies.

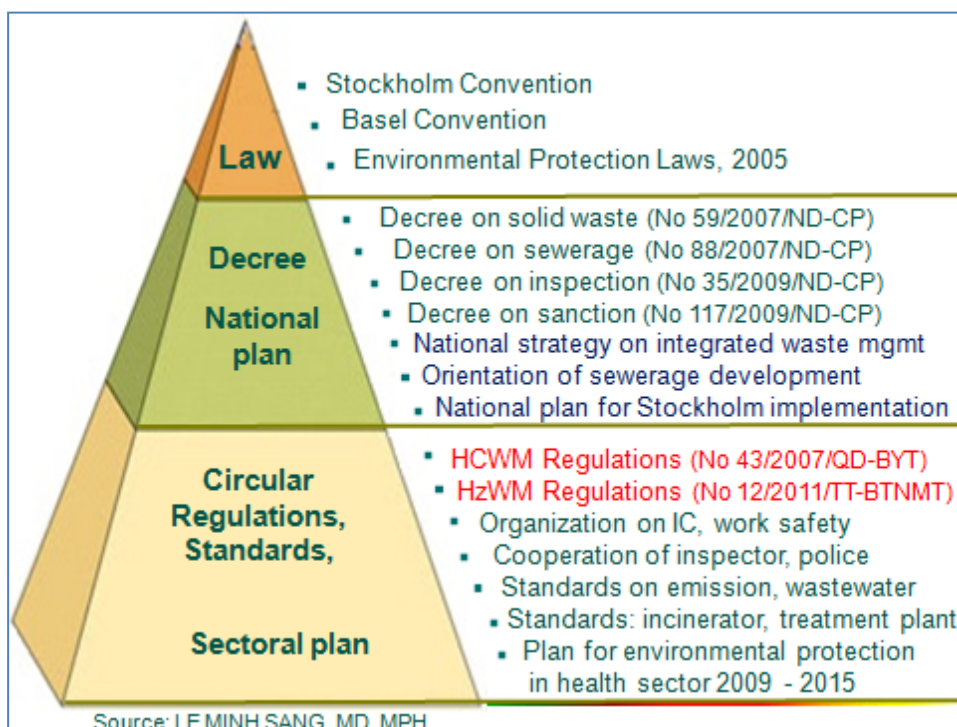
## **4. APPROACH FOR REVIEW OF POLICY**

### **4.1 Gathering of HCWM relating legal documents**

In 2005, National Assembly of Vietnam promulgated new Environmental Protection Law. The Law includes a Clause 39 (Chapter V) regulating environmental protection in hospitals and health facilities; a Chapter VIII (from clause 66 to clause 85) regulating management of hazardous waste, general waste, wastewater and gas emission. In order to execute new Environmental Protection Law, Vietnam Government developed and revised many policies. Decrees relating to waste management include: Decree on solid waste; Decree on drainage and sewerage in urban and industrial areas; Decree on organization of professional unit in charge of environmental protection in state owned organization; Decree on organization and activities of environmental inspection; Decree on sanction against administrative violance in the field of environmental protection; Decree on prevention and struggling of environmentally legal violences and crimes e.g. In addition, Prime Minister approved: National master plan for implementation of Stockholm Convention; National strategy for integrated management of solid waste until 2025; and Oriented development of drainage and sewerage in urban and industrial areas until 2025. The Ministries promulgated the Circulars, Decisions, National technical regulations, Standards and Action plans. Ministry of Health (MoH) promulgated HCWM Regulations năm 2007 (replaced HCWM Regulations 1997), an Official letter enforcing HCW management and treatment in 2008, Regulations on organization of system in charge of working safety in health facilities; hospital regulations in 2008, Guidelines for hospital infection control in 2009, and Environmental protection plan in health sector in period of 2009-2015. Ministry of Environment and Natural Resource (MoNRE) promulgated new HzWM Regulations; National technical regulations on wastewater and gas emission; Guidelines for environmental inspection

e.g. More than 40 legal documents were collected and reviewed (see ANNEX 1: List of legal documents). Figure 1 illustrates important policies reviewed in this report.

**Figure 1: Reviewed legal documents**



## 4.2 Classification of HCWM relating legal documents

### 2.2.1 Classification of legal documents by waste:

The policies can be divided into 3 groups by managed category of HCW:

- Group of policies focusing on solid HCWM: Environmental Protection Law, chapter VIII (from clause 66 to clause 80); Decree on solid waste; National strategy for integrated management of solid waste; HzWM Regulations; HCWM Regulations; Guidelines for hospital infection control; hospital regulations, National technical regulations and Vietnam standards on incinerator, solid waste landfill, hospital design; and Environmental protection plan in health sector in period of 2009-2015.
- Group of policies focusing on healthcare wastewater management: Environmental Protection Law, chapter VIII (clause 81,82); Decree on drainage and sewerage in urban and industrial areas; Oriented development of drainage and sewerage in urban and industrial areas; HCWM Regulations; Hospital regulations; National technical regulations and Vietnam standard on wastewater quality, design of external network and facilities of drainage and sewerage, hospital design; and Environmental protection plan in health sector in period of 2009-2015.

- Group of policies focusing on gas emission management: Environmental Protection Law, chapter VIII (clause 83,84,85); National master plan for implementation of Stockholm Convention; HCWM Regulations; National technical regulations on gas emission.

### 2.2.2 Classification of legal documents by process:

HCWM includes many processes: minimization, segregation, collection, transportation, storage, reuse, recycle, treatment, disposal, planning, training, responsibility assignment, structural organization, monitoring and supervision e.g. The policies can be divided into the following groups by managed process:

- Technical regulations on environmental quality: National technical regulation on healthcare wastewater, National technical regulation on HCW incinerator's gas emission, Standard on thresholds of hazardous waste e.g
- National technical regulations and Standard on design or technical specifications of waste management equipment and facility: Standard on design and appraisal of incinerator, **Standard on design of waste landfill**, Standard on design of drainage and sewerage network and facilities, Standard on design of general hospital e.g
- Regulations on waste management processes: **HCWM Regulations**, HzWM Regulations, Guidelines for hospital infection control, hospital regulations e.g
- Regulations on responsibility, obligation, organizational structure: Decree on solid waste; Decree on drainage and sewerage in urban and industrial areas; **Decree on organization and activities of environmental inspection**; Decree on organization of unit in charge of environment in state owned organizations; Decree on prevention and struggling of environmental crimes; HzWM Regulations; **HCWM Regulations**; Guidelines for hospital infection control; Regulations on organization of system in charge of working safety in health facilities; hospital regulations e.g
- Regulations on registry, licencing: Environmental Protection Law, HzWM Regulations e.g
- Regulations on monitoring, supervision, inspection: **Decree on organization and activities of environmental inspection**; Decree on prevention and struggling of environmental crimes; HzWM Regulations; **HCWM Regulations**; National technical regulations on waste
- Regulations on financial management: Decree on solid waste; Decree on drainage and sewerage in urban and industrial areas; Decree on sanctions against administrative violence; HCWM Regulations
- Strategies and plans: National strategy for integrated management of solid waste until 2025, Oriented development of drainage and sewerage in urban and industrial areas until 2025; National master plan for implementation of Stockholm Convention; Environmental protection plan in health sector in period of 2009-2015

Scope and main content of legal documents are presented in Table 1.





### 4.3 Analysis of legal documents:

The legal documents were reviewed based on the following dimensions:

- **Availability:** Some processes are covered by one or many regulations, however, some processes are not covered by any regulations.
- **Certainty:** Some regulations are not scientifically certain
- **Sufficiency:** Some regulations or technical guidelines are not fully prescribed.
- **Consistency:** Multiple laws, regulations and standards governed by several Ministries or agency. Discrepancy or inconsistency among them should be avoided.
- **Feasibility:** some regulations require so many resources that the relevant stakeholders can not perform.

**Table 1: Scope and main content of legal documents**

		Environmental Protection Law	Decree: solid waste	Decree: drainage and sewerage	Decree: inspection	Decree :organization and unit in charge	Decrees: sanctions, prevention and struggling of environmental crimes	National plan for integrated management of solid waste	National stragey for Stockholm convention implementation	Development orientation of sewerage	Regulations on HzW management	HCVM Regulations	Guidelines for hospital infection control	Regulations on working safety system	Hospital regulations	Environmental protection plan in health sector 2009 – 2015	QCVN gas emission HCW in cinerator	QCVN gas emission HzW incinerator	QCVN healthcare wastewater	TCVN design of HCW incinerator	TCVN appraisal of HCW incinerator	TCVN classification of HZW	TCVN warning sign	TCVN hygienic landfill design	Plumbing code	TCXDVN :HZW landfill design	TCVN sewerage – network and facilities	TCXDVN : general hospital design	Medical equipment list
<b>Waste</b>	General waste	X	X		X	X	X	X			X	X	X	X	X									X					
	Infectious waste	X	X		X	X	X	X			X	X	X	X	X	X	X	X		X	X	X	X			X		X	
	Chemical waste	X	X		X	X	X	X	X		X	X		X	X	X	X	X		X	X	X	X			X		X	
	Radioactive waste	X	X		X	X	X	X				X		X	X	X						X	X					X	
	Pressurized containers	X	X		X	X	X	X			X	X		X	X	X						X	X			X			
	Wastewater	X		X	X	X	X			X		X	X	X	X	X			X						X		X	X	
Gas emission	X			X	X	X		X			X		X	X	X	X	X			X	X	X						X	
<b>Managed area</b>	Definition, segregation	X	X					X	X		X	X	X		X	X						X							
	Color coding, labeling		X								X	X			X								X						
	Collection, transport	X	X					X			X	X	X		X	X									X		X		
	Interim storage	X	X					X			X	X	X		X	X													
	Off-site transport	X	X					X			X	X	X		X	X													
	Treatment, disposal	X	X	X				X	X		X	X	X		X	X	X	X	X	X	X	X			X	X	X	X	X
	Minimization	X	X					X	X		X	X				X													
	Reuse	X	X					X		X	X	X	X			X													
	Recycle	X	X					X			X	X				X													
	Planning	X	X					X		X	X	X				X													
	Financial mechanism	X	X	X	X			X		X		X				X													
	Human resource, training	X						X		X	X	X	X		X	X													
	Monitoring, supervision	X	X	X	X	X	X	X			X	X	X	X	X	X	X	X											
	Working safety	X						X						X		X													

Registry, licencing	X									X	X																				
Responsibility, organization	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X																

## 5. FINDINGS OF HCWM POLICY REVIEW

### 5.1 HCW definition and segregation

Definition and classification of waste are regulated in Environmental Protection Law, Decree on solid waste, HzWM Regulations and HCWM Regulations. Main content of relevant legal documents are summarized in Table 2.

**Table 2: Regulations on HCW definition and segregation**

Document	Main content
Environmental Protection Law	Organizations and individuals generating hazardous and ordinary solid wastes shall have to segregate wastes at source ( <i>Clause 71 and 77</i> ); ordinary solid wastes shall be classified into the following main categories: recyclable or reusable wastes, and wastes to be destroyed or buried ( <i>Clause 77</i> ); Owners of production, business and service establishments shall be responsible for recovering the following expired or discarded products: radioactive sources used, batteries, accumulators, electronic and electric equipment for civil and industrial use, lubricants, grease and packages hard to discompose in nature, drugs and chemicals, means of transport, tubes and tires ( <i>Clause 67</i> ); Arranging specialized equipment to sort at source pathological materials and medical garbage ( <i>Clause 39</i> );
Decree on solid waste	Ordinary solid wastes shall be classified into the following main categories: recyclable or reusable wastes, and wastes to be destroyed or buried ( <i>Clause 20</i> ). Hazardous solid wastes are classified in line with the list of HZW promulgated by MoNRE ( <i>Clause 21</i> ).
HzWM Regulations	HZW are classified into 19 groups by main generating sources. Wastes from healthcare sector include: sub-group of waste from healthcare and prevention processes (infectious waste, chemical waste, cytotoxic waste, amalgam) and sub-group of waste are waste medical devices (pressurized containers, and broken devices containing mercury and heavy metals) ( <i>Annex 8</i> )
HCWM Regulations	Healthcare wastes are material in solid, liquid, gaseous form arising from healthcare establishments, including hazardous wastes and general wastes ( <i>Clause 3</i> ). HCW is classified into 5 groups ( <i>Clause 5 and 6</i> ) as follows: <ul style="list-style-type: none"> <li>- Group 1: Infectious waste including 4 categories: sharp waste, non-sharp infectious waste; highly infectious waste; anatomical waste.</li> <li>- Group 2: Hazardous chemical waste including: Expired and unqualified medicine which are unusable; Commonly used chemicals in healthcare; Cytotoxic waste; Waste containing heavy metals</li> <li>- Group 3: Radioactive waste</li> <li>- Group 4: Pressurized containers</li> <li>- Group 5: General waste, : Domestic waste originating from patients' rooms; Waste generated from medical practices; Waste from administrative works; External-environment wastes</li> </ul>

In general, classification of HCWM into 5 groups as regulated in clause 5, 6 of HCWM Regulations is similar to WHO's guidelines and international practices. However, there are 3 disadvantages in current definition and classification of HCW categories as follows:

- There is uncertainty in definition of highly infectious waste in HCWM Regulations (clause 6, item 1, point c) where wastes from laboratory are considered as highly infectious waste. In reality, many wastes from laboratory is lowly infectious such as sample of urine.
- Definition and classification of commonly used chemical wastes in HCWM Regulations (clause 6, item 2, point b) are uncertain and insufficient. Commonly used chemical wastes in healthcare include Formadehyde, photochemicals, solvents, oxide ethylene and mixture chemicals (as listed in Annex 1 of HCWM Regulations). Because these chemicals are different from each other in terms of their hazards and physical characteristics, safe and effective management of them requires better definition and classification.
- There is inconsistency between legal documents in classification of general waste. According to HCWM Regulations (in clause 6, item 5), general HCW is classified into 4 categories by generating source. Meanwhile, Environmental Protection Law and Decree on solid waste classify general waste into 2 categories: recyclable or reusable wastes, and wastes to be destroyed or buried.

## 5.2 Color coding and labeling

Although Environmental Protection Law, Decree on solid waste, HzWM Regulations and HCWM Regulations have definition of waste management, non of definitions includes processes of color coding and labeling. Environmental Protection Law and HzWM Regulations do not even include any clause or item on color coding. Meanwhile, HCWM Regulations include a separate clause (clause 7) on color coding with 4 colors. It is not clear enough to code color for general waste: green or blue. There is inconsistency in color coding between HCWM Regulations (4 color coding system) and Hospital Regulations (3 color coding system).

Environmental Protection Law does not include any clause or item on labeling either. Decree on solid waste, HzWM Regulations, HCWM Regulations, Hospital Regulations all include regulations on labeling of package, bins for hazardous waste. However, the regulations on labeling in different legal documents are not consistent with each other (see Table 3). HzWM Regulations require labeling with the following information: Name and code of HZW, name and address of HZW generating place, date of packaging; warning sign according to TCVN 6707:2009 and of at least 5 cm in size. HCWM Regulations only introduce warning signs of biohazard, radioactive hazard, and cytotoxic waste but does not introduce other

warning signs (of toxic, flammable, explosive, corrosive hazards e.g) in TCVN 6707:2009. Hospital Regulations do not require label of warning signs. The insufficiency and inconsistency in regulations on warning signs can result in difficulties for health facility in labeling.

**Table 3: Regulations on color coding and labeling**

Document	Color coding	Labeling
Decree on solid waste	Ordinary solid waste shall be stored in bags or tanks of given colors as specified by regulations ( <i>Clause 19</i> );	Hazardous solid waste shall be labeled with necessary information according to regulations ( <i>Clause 23</i> )
HZW Regulations	Not regulated	Label on package shall be clear, readable, un-dim, un-faded. Label includes the following information: Name and code of HZW, name and address of HZW generating place, date of packaging; warning sign according to TCVN 6707:2009 and of at least 5 cm in size ( <i>Annex 7</i> )
HCWM Regulations	Color coding system includes 4 colors: Yellow color for infectious waste; Black color for hazardous chemical waste and radioactive waste; Green color for general waste and pressurized containers; White color for recyclable waste ( <i>Clause 7</i> ).	Labeling and warning signs are regulated as follows: Biohazard symbol on yellow bags, bins; Inscription of "SHARP WASTE ONLY" on sharp box; Inscription of "CYTOTOXIC WASTE" and its warning sign on the bags, bins containing cytotoxic waste; Inscription of "RADIOACTIVE WASTE" and radioactive warning sign on the bags, bins containing radioactive waste; Inscription of "ANATOMICAL WASTE" on the bags, bins containing anatomical waste; Symbol of recyclable waste on white bags, bins ( <i>Clause 9,11, 17</i> ). Waste bags shall be labeled with its generating place ( <i>Clause 14</i> )
Hospital regulations	Solid waste is contained in 3 color coded bags and bins: green one contains non-toxic waste, yellow one contains infectious waste, black one contains chemical waste, radioactive waste and toxic waste	Orderlies are responsible for labeling of department's name



### 5.3 Collection and on-site transportation

- Collection and on-site transportation of solid waste: Requirements for tools, devices as well as methods of solid waste collection and transportation in health facilities are fully described in HCWM Regulations (from clause 7 to clause 12 chapter III and in clause 14, 15 chapter IV). However, **responsibility and obligation of owner of enterprise collecting and transporting HzHCW within health facilities are not regulated**. According to Hospital regulations and HCWM Regulations, the hospital orderlies and environmental workers are assigned to collect and transport HzHCW to interim storage. Meanwhile, Environmental Protection Law allows owner of HzW generation to sign contract transferring HzW to a facility collecting HzW. In reality, many hospitals signed contract with hygiene companies to collect HzHCW from departments to interim storage within hospital precinct.
- Collection of liquid waste: Design and operation of wastewater collection are fully described in Plumbing code, TCVN 7957:2008: design of drainage and sewerage external network and facilities. However, HCWM Regulations do not refer to these standards, hence, the reader may have difficulties in implementation of wastewater management regulations. HCWM Regulations only regulate collection and on-site transportation of solid hazardous waste (in chapter III, IV) and collection of wastewater (in clause 27 chapter IX), but HCWM Regulations do not include any regulation on methods and devices for collection and on-site transportation of liquid chemical waste within health facilities.

### 5.4 Storage

- Waste storage is regulated in Environmental Protection Law, Decree on solid waste, HzWM Regulations, HCWM Regulations and hospital regulations.
- HCWM Regulations and HzWM Regulations regulate requirements for design of waste storage area. However, there are inconsistencies between two legal documents. Requirements for ground, floor, roof, wall, and cells of storage house in HzWM Regulations are more detailed than those in HCWM Regulations. HzWM Regulations refer to Standard 4317:86 on design of warehouse. HCWM Regulations regulate requirements for safe distance, access way for transportation devices which are not regulated in HzWM Regulations. (see Table 4). Meanwhile, Hospital regulations only regulate that the storage house has roof and surrounding fence and locate in direction of north-west of the hospital. Vietnam construction standard TCXDVN 365:2007 on design of general hospital even does not include requirement for HCW storage house.
- Requirements on equipments in waste storage area in legal documents are not consistent with each other. Environmental Protection Law (Clause 71, item 1)



regulates that HzW shall be stored in specific equipment to avoid leakage, spillage into environment. HzWM Regulations regulate more specific and clearer requirements for equipment storing HzW (shell, structure, lid, and warning sign) and auxiliary equipments in storage area (fire extinguisher, adsorption material, first aids tools, loading and unloading equipment, communication equipment, abridged instructions...). Meanwhile, HCWM Regulations do not include any requirement for HCW storage equipment and only include some requirements for cooling equipment, hand washing facility, cleaning tools and chemicals (see Table 5). HCW storage equipments are not included in medical equipment list of health facility.

- Method of hazardous waste storage regulated in HCWM Regulations is insufficient to practise, unsuitable to some waste categories and inconsistent with those in HzWM Regulations (see Table 6). HCWM Regulations do not regulate separate storage of different categories of HzW but HzWM Regulations do. The regulation of storage time in item 4, clause 16 of HCWM Regulations (the maximum duration for keeping healthcare waste in healthcare establishments is 48 hours or 72h in cold warehouse/bins) only suitable to the group of Infectious waste but not suitable to the groups of chemical waste, radioactive waste and pressurized containers. HzWM Regulations allow storing HzW in 6 months or longer if environmental management agency agrees. Practically, in many remote areas, HzWM practitioners have not enough capacity to treat and disposal of hazardous chemical waste, thus health facilities have to store hazardous chemical waste safely in their precinct until they can find local solution. However, safe storage as final solution is not recognized in legal documents.

## **5.5 Off-site transportation**

- Off-site transportation of waste is regulated in legal documents including Environmental Protection Law, Decree on solid waste, HzWM Regulations, HCWM Regulations and Hospital Regulations.
- Vehicle for HzW transportation accompanied with containers and auxiliary equipments are fully described in Item 3, Annex 7 of HzWM Regulations. Because of earlier promulgation, HCWM Regulations do not update above requirements of HzWM Regulations but refer to an invalid Circular (No 12/2006/TT-BTNMT).
- In rural or remote areas, HzW off-site transportation facility often do not meet requirements for HzWM practitioner regulated in chapter II of HzWM Regulations. There is not any legal document regulating requirements for off-site transportation devices in resource limited area.

**Table 4: Requirements of storage house**

Requirements	HZW Regulations	HCWM Regulations
<b>Safe distance</b>	Not regulated	Being far from food-preparing places, patients' wards, crowded sites and public paths at least 10m
<b>Floor</b>	The floor is high enough to avoid flood, designed to prevent overflow of raining water; Floor is close, not cracked, floor material is water-proof, corrosion resistant and not able to react to HzW; Floor can stand weight of HzW at highest load.	Water-resistant floor
<b>Roof</b>	Whole storage area are protected by fire resistant roof from sun, rain, except for storage equipment having capacity of more than 5 m <sup>3</sup>	Being built with roof
<b>Wall</b>	Wall and division are made of fire resistant material; Storage of liquid HzW shall have surrounding wall, dike or edge or a secondary isolating measure to prevent HzW from dispersion into environment in case of accident.	Water-resistant wall;
<b>Internal space</b>	Storing area must be divided into separate cells or units for each category of HzW or group of HzW by fire-resistant division whose height is higher than loaded HzW.	The land areas are suitable to the waste volumes generated from the healthcare establishments. Hazardous waste and general waste shall be kept in separate rooms
<b>Sewerage</b>	There is drainage to collect liquid to a manhole that is lower than the floor to avoid overflow in case of cleaning, fire fighting or leakage, spillage	Being built with water drainage systems
<b>Ventilation</b>	Design or solutions can prevent storage from direct wind	Good ventilation
<b>Entrance</b>	Not regulated	Having ways for waste carriers to come
<b>Other</b>	If interim storage is designed as warehouse, it shall meet Vietnam standard TCVN 4317:86 – Warehouse – Basic principle of design or equivalent or higher international standards	Having protection fences, doors and locks.

**Table 5: Requirements for storage equipment**

<b>Requirements</b>	<b>HZW Regulations</b>	<b>HCWM Regulations</b>
<b>Storage</b>	HZW storage equipment shall meet the following requirements: shell can resist against corrosion, infiltration or adsorption, be stainless, not react to chemicals inside, be reinforced at connection and charging, discharging points to avoid leakage; Structure is firm to stand clash, not to broken, deform during utilization; Warning sign in line with TCVN 6707:2009 has at least 30 cm in each size, is clear to read; Equipment storing liquid or evaporate HZW shall have closed lid, measure to control evaporation, measure to control overflow;	Not regulated
<b>Cooling</b>	Not regulated	To encourage healthcare establishments to keep waste in cold warehouse, containers
<b>Fire fighting</b>	Fire fighting equipments are in place (at least a fire extinguisher, sand) according to regulations of fire prevention and fighting authority	Not regulated
<b>Adsorption</b>	Adsorption materials (such as dry sand or sawdust) and shovel in case of liquid HZW leakage and spillage	Not regulated
<b>First aid</b>	First aid box; vase of sodium bicarbonate solution to neutralize acid burning in case of acid storage	Not regulated
<b>Hand washing and cleaning</b>	Not regulated	Being equipped with facilities for hand-washing, means for protection of personnel, cleansing tools and chemicals
<b>Loading</b>	Manual or physical loading and unloading equipments are in place	Not regulated
<b>Communication</b>	Communication equipments are in place (such as telephone)	Not regulated
<b>Alarm</b>	Alarm equipments are in place (such as hooter, speaking - trumpet)	Not regulated
<b>Warning sign</b>	There must have warning sign correlative to stored HZW category in each cell or unit of storage area and on each storage equipment. Warning signs comply with TCVN 6707:2009, have at least 30 cm in each size; color and inscription on warning sign are not faded.	Not regulated
<b>Emergency exit</b>	Diagram of emergency exit posted at clue of ways	Not regulated
<b>Abridged instruction</b>	Abridged instructions of safe operating procedures, accident response, working safety and health protection are in place; convenient to see, easy to read	Not regulated

**Table 6: Requirements for operation of storage area**

Requirements	HzWM Regulations	HCWM Regulations
<b>Arrangement of waste storing area and equipment</b>	Storing area must be divided into separate cells or units for each category of HzW or group of HzW by fire-resistant division whose height is higher than loaded HzW. Storage area of flammable, explosive HzW shall locate at least 10 m far from incinerator, autoclave, and other combustion equipment. Packaged HzW shall be located at least 50 cm far from the wall, not higher than 300 cm, main path is straight and at least 150 cm in width. Hydrophobic HzW shall be put on dais or sheet that is at least 30 cm in height. When loaded packages of HzW are more than 150 cm, they should be put on elevator or fastened to avoid falling. Liquid waste containing PCB, Persistent organic pollutants listed in Stockholm convention and other halogen containing organics shall be stored in hard package or storage equipment placed on elevating sheet and shall not be accumulated.	Hazardous waste and general waste shall be kept in separate rooms. Recycling/reusing waste shall be kept separately.
<b>Storage time</b>	HzW shall be transported rapidly to treatment facility. If HzW need to be stored more than 06 months because there is not any feasible solution or suitable HzWM practitioner or amount of HzW is too small, owner of HzW generation is responsible for informing HzWM agency by official document or incorporated HzWM report.	The maximum duration for keeping healthcare waste in healthcare establishments is 48 hours; The duration for keeping healthcare waste in cold warehouse/bins is 72 hours; Pathological waste shall be transported for burying and destroying daily; For healthcare establishments with daily volume of waste under 5 kg/day, the duration for gathering is at minimum twice a week.
<b>Access limitation</b>	Not regulated	To prevent animals, rodents and unassigned persons from freely penetrating therein

## 5.6 Treatment and disposal

- Waste treatment and disposal are regulated in many legal documents, however, there are some regulations or requirements still missing, insufficiency, infeasibility, and many inconsistencies between legal documents can be found.
- *Selection of solid HCW treatment model:* Environmental Protection Law, Decree on solid waste, HzWM Regulations introduce two model of treatment and disposal: onsite or off-site. Clause 19 in HCWM Regulations introduces 3 models of treatment and disposal: onsite treatment facility, treatment facility serving cluster of hospitals, and centralized treatment facility. Meanwhile, some legal documents still regulate hospital to have onsite HZHCW treatment facility such as Hospital Regulations and Vietnam standard TCXDVN on design of general hospital. In addition, guidance for selecting HCW treatment model in HCWM Regulations is not sufficient. Afterwards, Minister of Health issued an Official letter enhancing HCWM management and treatment that provided clearer and more sufficient guidance for selecting HCW treatment model than those in Clause 19 HCWM Regulations (see Table 7).
- *The regulations on off-site treatment and disposal of waste* are insufficient and inconsistent with each other. Environmental Protection Law, Decree on solid waste, HzWM Regulations regulate that the owner of HzW generation must sign contract with licenced HzWM practitioners, meanwhile, HCWM Regulations regulate that health facility's director must sign contract with organizations or individuals having legal status. HCWM Regulations do not regulate content of contract transferring responsibility for HzHCW treatment but the clause 73 of Environmental Protection Law does (see Table 7).

**Table 7: Regulations on off-site HCW treatment and disposal**

Document	Content
Environmental Protection Law, 2005	A contract of transfer of the hazardous waste treatment responsibility must specify the origin, composition and kind of hazardous waste, treatment technology and burying measure after treatment ( <i>Clause 73</i> )
HzWM Regulations	If HzW treatment facility is not in place, owner of HZW generation is responsible for signing contract referring HZW to HzWM practitioners having suitable licence, territory and HzW list ( <i>Clause 25</i> )
HCWM Regulations	Models of HzHCW treatment and disposal include: a) centralized treatment and disposal facility; b) Treatment and disposal facility for cluster of hospital; c) On-site treatment and disposal facility. Based on plans, geographic factors, economic and environmental conditions, healthcare establishments should implement one of models of treatment and disposal. For transportation, treatment, disposal of healthcare waste, a operation contract can be signed to legal-status bodies/individuals ( <i>Clause 19, 31</i> )
MoH's official letter enhancing HCW management and treatment	Central government belonged cities apply centralized treatment model; Other cities and provinces apply clustering treatment model or hospitals and health facilities locating less than 30 km from capital; Hospitals and health facilities in remote areas apply on-site treatment model

- *Waste treatment and disposal technologies* are introduced in Decree on solid waste, HzWM Regulations, HCWM Regulations, Hospital regulations, Standard on general hospital design (see Table 8), however, no treatment technology is introduced in Medical equipment list.

**Table 8: HCW treatment methods introduced in legal documents**

Treatment and disposal methods	Decree on solid waste	HzWM Regulations	HCWM Regulations	Hospital regulations	List of medical equipment	TCXD on disgn of general hospital	TCVN on solid HCW incinerator	TCXD on HzW landfill	TCVN on sewerage facility
<b>HCW treatment</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>		<b>X</b>	<b>X</b>	<b>X</b>	
Incineration	X	X	X	X		X	X		
HZW landfill	X	X	X					X	
Hygienic bury	X		X	X					
Disinfection by wet thermal			X						
Disinfection by microwave			X						
Disinfection by chemicals			X						
Needle destroyer			X						
Alkali hydrolysis			X						
Composting	X								
Biogas creating	X								
Recycle into construction materials	X								
Encapsulation in concrete pit		X	X						
Inertization		X	X						
Discharge into sewerage system			X						
Neutralization			X						
Heavy metal recover			X						
Return to supplier			X						
<b>Wastewater treatment</b>			<b>X</b>	<b>X</b>		<b>X</b>			<b>X</b>
Physical treatment facility									X
Chemical treatment facility									X
Biological treatment facility									X
<b>Sludge treatment</b>			<b>X</b>						<b>X</b>
Sludge compressor			X						X
Metal tank									X
Sludge drying facilities									X

<b>Gas emission treatment</b>			<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>	<b>X</b>		
Hotte			X	X	X	X			
Air pollution control device			X				X		

- There are inconsistencies between legal documents about HCW treatment technologies. Meanwhile HCWM Regulations introduce more than 14 treatment technologies applicable to HCW treatment, Hospital Regulations only introduce two treatment technologies (incinerator and hygienic landfill), Vietnam standard TCXDVN on design of general hospital only introduce one treatment technology (solid HCW incinerator). Even in HCWM Regulations, names of technologies are not unite, for instances, technology of “Disinfection by wet thermal” in item 2 clause 20, in point b item 2 clause 21 and in point b item 1 clause 22. Some solid HCW treatment technologies available in local market are not introduced in HCWM Regulations such as shredding, compacting, electrical needle destroyer e.g. Vietnam standard on design of drainage and sewerage external network and facilities introduce 27 kind of wastewater facilities, meanwhile HCWM Regulations do not introduce any facility, but only regulate that health facility must have a wastewater treatment plant.
- *Some regulations on treatment technologies applicable to categories of HCW* (chapter VIII and chapter IX of HCWM Regulations) are uncertain, inconsistent with other legal documents and infeasible to implement. The technology of “disinfection by microwave” and “disinfection by wet thermal” are allowed to treat infectious waste (in item 1 clause 22) but only the technology of “disinfection by wet thermal” is allowed to treat primarily highly infectious waste (in clause 21). In item 2 clause 22, treatment technologies applicable to sharp waste do not include electrical needle destroyer which is available in local market. In item 3 clause 22, it is regulated that anatomical waste can be treat in the same manner applied to infectious waste, but in reality, single disinfection method applicable to infectious waste can not make anatomical waste unrecognizable. In item 4 clause 23, technologies allowable to treat waste containing heavy metals are not suitable to treat waste containing mercury – an evaporative substance. Recycle of HzW is banned in item 4,5 Clause 4, but Recover of heavy metal in hazardous chemical waste is allowable in Clause 23. HzW landfill is only allowed to dispose pharmaceutical waste, but HzW landfill can be applicable to other HzHCW (except for radioactive waste). Incinerator is most commonly introduced in HCWM Regulations despite the fact that HCWM Regulations discourage this method, HzWM Regulations do not allow installation of small scale incinerator (capacity of less than 100 kg/h). In clause 24, existing regulations on radioactive waste treatment and disposal are not fully referred or described. There is not any regulation on treatment and disposal of secondary waste such as incinerator’s bottom ash and sludge of hospital wastewater treatment plant.
- *Technical requirements for treatment facilities:* Although more than 14 HCW treatment technologies are introduced, HCWM Regulations only describe technical requirements

for hygienic landfill and concrete bury pit. However, these requirements are not consistent with those in other legal documents such as Environmental Protection Law, HzWM Regulations and Vietnam construction standard on design of HzW landfill (see Table 9, 10). In HCWM Regulations, incinerator is introduced many times but technical requirements for incinerator are not described. **There is a Vietnam standard (TCVN 7380:2004) on technical requirements for solid HCW incinerator but it is not referred in HCWM Regulations.** The standard TCVN 7380:2004 has some weaknesses as follows: (i) it only allows incinerating clinical waste, meanwhile HCWM Regulations allow to treat chemical waste, pharmaceutical waste and some cytotoxic wastes by incinerator; (ii) almost technical requirements for solid HCW incinerator in TCVN 7380:2004 are not consistent with those in National technical regulation on industrial waste incinerator (see Table 11); (iii) TCVN 7380:2004 refers to invalid standards. **Ministry of Health is encouraging the hospital to apply environmentally sound technologies such as Disinfection by wet thermal and MoH has plan for scaling up non-burn technologies (according to Environmental protection plan in health sector), but there is not any regulation or standard on technical specifications of non-burn technologies.**

**Table 9: Technical requirements for bury of HCW**

Document	Main content
Environmental Protection Law, 2005	Hazardous waste burial sites must meet the following environmental protection requirements: a) Being located according to planning, designed according to technical specifications applied to hazardous waste burial sites; being located at an environmentally safe distance from residential areas, nature conservation zones, surface water and ground water sources for daily-life use; having boundary fences and warning signboards; b) Having plans and equipment for prevention of and response to environmental incidents; c) Meeting all environmental sanitation conditions and not dispersing toxic gases to the surrounding environment;d) Having been inspected and certified by competent state management agencies to satisfy all technical specifications for receiving and burying hazardous wastes before being put to operation (Clause 75)
HzWM Regulations	Design, construction of HzW landfill shall comply with approved environmental impact assessment (EIA) report and construction standard TCXDVN 320:2004: HzW landfill – design standard (Item 5 annex 7)
Standard on design of hazardous waste landfill (TCXDVN 320:2004)	The standard is applied to design, construct HzW landfill; renovate or design new cells in existing HZW landfill. The standard includes regulations on landfill size (small landfill has area of less than 1 ha; medium landfill has area of 1-3 ha, big landfill has area of 3-6 ha); Landfill classification by waste hazards (flammable and explosive waste landfill; toxic waste landfill; corrosive waste landfill; mixed waste landfill); Requiements for land and surface (such as minimum height of ground; total area; buffer zone; fences: safe distance); Requirements for facility and designing solutions for pre-treatment zone, landfill zone, wastewater treatment zone; auxiliary zone.
HCWM Regulations	<i>Hygienic bury</i> : temporarily applied for healthcare establishments in mountainous and mild land regions where standard-satisfying establishments of infectious waste treatment aren't available. Dispose landfills are stipulated by local authority and accepted by local environmentally managerial bodies in the



	area. The landfills must meet requirements: surrounding fence, far from water well, far from housing area at least 100 m, bottom of landfill separated from surface water level by 1.5 m at minimum, opening of the landfill is prominent and temporarily covered to prevent rain water; a soil layer of 10-25 cm is heaped up on the surface of hole in each time of burial; and the thickness of top soil layer is 0.5m. Do not bury infectious waste together with general waste. Infectious waste must be disinfected before burying.
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**Table 10: Technical requirements for encapsulation by concrete tank**

Document	Main content
HZW Regulations	Encapsulation pit includes 3 types: underground pit, sub-underground pit, and surface pit; Pit is located at area where groundwater level is suitable; Area of bottom of each pit $\leq 100 \text{ m}^2$ and the height $\leq 5 \text{ m}$ ; Bottom and wall are made of leak-proof ferro concrete and located on reinforced ground; Wall (underground part) and bottom are enclosed by a leak-proof layer; Roof is in place to protect pit's surface from sun and rain, and measure is in place to protect pit's content from direct wind; When the pit is full, enclose the pit by leak-proof ferro concrete cover; the cover must cover all pit's surface to prevent leakage and endosmosis ( <i>Item 5 annex 7</i> )
HCWM Regulations	Pit's bottom, wall and cover are made of concrete

**Table 11: Technical requirements for HCW and industrial waste incinerators**

Requirements for incinerator	HCW incinerator (TCVN 7380:2004)	HZW incinerator (QCVN 30:2010/BTNMT)
Scope of application	Clinical waste (category A,B,C,D,E)	Industrial waste; Applicable to HCW
Temperature in primary chamber	$\geq 800 \text{ (}^\circ\text{C)}$	$\geq 700 \text{ (}^\circ\text{C)}$
Temperature in secondary chamber	$\geq 1200 \text{ (}^\circ\text{C)}$	$\geq 1050 \text{ (}^\circ\text{C)}$
Temperature in outer cover	$\geq 50 \text{ (}^\circ\text{C)}$	$\geq 60 \text{ (}^\circ\text{C)}$
Retention time	$\geq 1,5 \text{ (s)}$	$\geq 2 \text{ (s)}$
Minimum height of chimney	8 m	15 m
Control of gas emission	TCVN 6560:1999	QCVN 30:2010/BTNMT
Control of wastewater	TCVN 5945:2004	QCVN 24:2009/BTNMT
Electrical safety	Meet current regulations	Grounding resistance of metal parts contactable to human is $\leq 4 \Omega$
Operation	Not available	Operation and maintenance in line with manufacturer's instruction; load waste when temperature reaches regulatory value; only terminate operation when all waste in primary chamber is burnt; operate air pollution control as soon as incinerator is started up and as long as gas is not emitted and temperature in primary chamber is less than $400^\circ\text{C}$
Emergency response	Meet current regulations on prevention and control of fire and explosion	Plan for response to fire and explosion and other other emergency as regulated; automatic shutdown in case of irregular breakdown together manual shutdown; solution for reducing temperature in

		combustion areas when temperature overreach; air pollution control system include bypass valve
Monitoring and supervision	Automatic and continuous monitoring of temperature in combustion chambers	Automatic and continuous monitoring of temperature and oxygen in combustion chambers; Regular monitoring of gas emission, wastewater, sludge, ash; Monitoring of Dioxin/furan once per year

- *Healthcare wastewater treatment:*

According to clause 27 in HCWM Regulations, each hospital shall have a wastewater treatment plant. In the case that some hospitals locating side by side on the same land are using a wastewater treatment plant together, the compliance with this regulation may cause costly investment. Treated wastewater shall meet National technical regulation QCVN 28:2010/BTNMT on quality of healthcare wastewater. There are inconsistencies (parameters of pH, COD and sulfur) between National technical regulation QCVN 28:2010/BTNMT and other National technical regulations on quality of wastewater including QCVN 14:2008/BTNMT, QCVN 24:2009/BTNMT (see Table 12).

**Table 12: Comparison of national technical regulations on wastewater**

Parameters	Unit	QCVN 28:2010/BTNMT healthcare wastewater		QCVN 14:2008/BTNMT Domestic wastewater		QCVN 24:2009/BTNMT Industrial wastewater	
		A	B	A	B	A	B
pH		6,5 - 8,5	6,5 - 8,5	5 - 9	5 - 9	6 - 9	5,5 - 9
BOD5 (20°C)	mg/l	30	50	30	50	30	50
COD	mg/l	50	100	-	-	-	-
TSS	mg/l	50	100	50	100	50	100
Sulfur	mg/l	1.0	4.0	1.0	4.0	0.2	0.5
Ammonia	mg/l	5	10	5	10	5	10
Nitrate (NO <sub>3</sub> <sup>-</sup> )	mg/l	30	50	30	50	-	-
Phosphate (PO <sub>4</sub> <sup>3-</sup> )	mg/l	6	10	6	10	-	-
Oil and fat	mg/l	10	20	10	20	10	20
α radioactivity	Bq/ml	0,1	0,1	-	-	0,1	0,1
β radioactivity	Bq/ml	1	1	-	-	1	1
Total Coliforms	MPN/100 ml	3.000	5.000	3.000	5.000	3.000	5.000
Salmonella	VK/ 100ml	KPH	KPH	-	-	-	-
Shigella	VK/ 100ml	KPH	KPH	-	-	-	-
Vibrio cholera	VK/ 100ml	KPH	KPH	-	-	-	-

### *Treatment of gas emission:*

Official letter No 7164/BYT-KCB of Minister of Health enhancing HCW management and treatment requests that HCW incinerator shall have air pollution control device. However, there is not any regulation on specifications of air pollution control device. There are only regulations on quality of gas emission including national technical regulations on HCW incinerator's gas emission, HZW incinerator's gas emission; and industrial gas emission. There are inconsistencies between three national technical regulations (see Table 13).

**Table 13: Comparison of national technical regulations on gas emission**

Parameters	QCVN 02:2008/BTNMT: HCW incinerator's gas emission	QCVN 30:2010/BTNMT: Industrial waste incinerator's gas emission	QCVN 19:2009/BTNMT: Industrial gas emission	
			A category	B category
Dust (mg/Nm <sup>3</sup> )	115	150	400	200
Flohydric acid (mg/Nm <sup>3</sup> )	2	5	50	20
Chlohydric acid (mg/Nm <sup>3</sup> )	100	50	200	50
Carbon monoxide (mg/Nm <sup>3</sup> )	100	300	1000	1000
Nitrogen oxide (mg/Nm <sup>3</sup> )	250	300	1000	850
Sulfua dioxide (mg/Nm <sup>3</sup> )	300	500	1500	500
Mercury (mg/Nm <sup>3</sup> )	0,55	0,55	-	-
Cadimi (mg/Nm <sup>3</sup> )	0,16	0,16	20	5
Lead (mg/Nm <sup>3</sup> )	1,2	-	10	5
Total other heavy metals (mg/Nm <sup>3</sup> )	-	2	-	-
Total Dioxin/ Furan (ng-TEQ mg/Nm <sup>3</sup> )	2,3	0,6	-	-

## **5.7 Prevention, reduction, reuse and recycle**

- *Prevention and reduction:* all legal documents consider prevention and reduction as important works of waste management; and owner of waste generation has responsibility and obligation for applying measures to prevent and reduce waste generation. However, there is not any regulatory document guiding methods of prevention and reduction of hazardous waste.
- *Recycle:* Regulations on waste recycle in HCWM Regulations are not consistent with each other and not feasible to implement. In clause 26, the list of recyclable waste does not include kitchen waste that is commonly recycled in reality. Clause 4 of HCWM Regulations ban HzW recycle but Clause 23 allows recover of heavy metal in hazardous chemical waste. Banning HzW recycle in HCWM Regulations conflict with other legal documents. Environmental Protection Law encourages waste recycle (clause 4,5,6). Decree on solid waste regulates that ordinary solid wastes shall be classified into the following main categories: recyclable or reusable wastes, and

wastes to be destroyed or buried (clause 4). National strategy for integrated management of solid waste enhances waste recycle and reuse to reduce amount of waste need to be buried. The strategy also set basic tasks to enhance waste recycle as follows: enhance solid waste recycle, develop recycling industry, encourage purchasing recycle products, develop and apply policies having incentives to recycle activities, establish recycle facility. Out of action programs to implement the strategy, there is a action program promoting prevention, reuse and recycle of solid waste.

- *Reuse*: Existing regulation on reuse of waste is sufficient and feasible. Ministry of Health issued guidelines for disinfection of reusable medical instruments and linens. HCWM Regulations allow reuse of plastic containers for sharp waste.

## **5.8 Working safety and emergency response**

- *Working safety*: Regulations on organization and activities of system in charge of working safety in health facilities (promulgated in accordance with Decision 3079/QĐ-BYT) regulate specific tasks relating working safety (such as development of procedures, planning, training, organization and supervision for implementation of working safety measures, supervision of working environment, prevention of occupational health and management of occupational health profile) in health facilities. Decision No 68/2008/QĐ-BLĐTBXH dated 29/12/ 2008 of Minister of Labour – Invalid – and Social Affairs promulgating the list of personal protective equipments (PPEs) for labours working in hazardous condition. The list includes PPEs for HCW generators (doctors, nurses) and HCW collectors. It is uncertain scientifically when nurses (waste generators) and orderlies (waste collectors) have the same PPEs. The list does not include PPEs for workers operating solid HzHCW treatment facility and wastewater treatment plant in health facilities. There is not any technical requirement or National technical regulation on performance specifications of PPEs.
- *Prevention and treatment of accident*: Environmental Protection Law, Decree on solid waste and HzWM Regulations all include regulations on prevention and treatment of accident relating HzW. However, HCWM Regulations do not include any regulation on prevention and treatment of accident relating HCW. Regulations on organization and activities of system in charge of working safety in health facilities only include regulation on prevention and treatment of injury (probably relating to sharp waste) but no regulation on response to HzHCW leakage and spillage.

## **5.9 Responsibilities of stakeholders**

- *Responsibility and obligations of stakeholders* are described in many legal documents: Environmental Protection Law, Decree on solid waste, Decrees and Circular guiding environmental inspection and prevention, struggling of environmental crimes, Decree and Circular guiding preparation of EIA report or EMP, especially HzWM Regulations and HCWM Regulations. These legal documents mention responsibilities of owner of HzW generation (including director of health facility), owner of HzW transportation facility, owner of HzW treatment and disposal facility, and environmental management agencies such as policy makers, inspections, environmental polices. However, there is not any regulation on

responsibilities and obligations of owner of HzW collection company working in hospital precinct. At present, industrial hygiene companies are contracting with hospitals for collection and on-site transportation of HzHCW but these companies must not have license of HCWM practitioner and comply with conditions of HCWM practitioner. Table 4 presents responsibilities of stakeholders in HzHCWM.

- *Responsibility and obligations of health facility's director or owner of HzW generation:* HCWM Regulations regulate responsibilities of health facility's director meanwhile HzWM Regulations regulate responsibilities of owner of HzW generation. Both two legal documents lack regulation on planning for working safety and prevention, treatment of accident. HCWM Regulations assign to health facility's director 2 responsibilities that are not described in HzWM Regulations: to develop HCWM plan and to provide staff with training. Hospitals having HCW onsite treatment facility – who often cause pollution of ambient environment – must not comply with conditions of HzWM practitioner. However, responsibilities, obligations and requirements of owners of HzW generation treating HzW by their own are not fully described.
- *There is overlap between responsibilities of environmental management agencies.* In inspection of HCWM activities, both health inspectors, environmental inspectors and polices have responsibility and authority. There is a regulation on coordination and cooperation between environmental inspectors and polices in prevention and struggling of environmental crimes, but there is not any regulation on coordination and cooperation between health inspectors, environmental inspectors and polices in HCWM.

**Table 14: Regulatory responsibilities of stakeholders in HCWM**

<b>Regulatory responsibilities</b>	<b>Owner of generation</b>			<b>HZWM practitioner</b>				<b>Management agency</b>		
	<b>Director of health facility<sup>1</sup></b>	<b>Owner of HZW generation<sup>2</sup></b>	<b>Owner of HZW generation treating HZW on his own</b>	<b>Owner of HZW collection</b>	<b>Owner of HZW transportation facility<sup>2</sup></b>	<b>Owner of HZW treatment facility<sup>2</sup></b>	<b>Owner of HZW reuse<sup>2</sup></b>	<b>MoNRE and DoNRE</b>	<b>MoH and DoH</b>	<b>Environmental police</b>
Reduction	X	X	X							
Segregation	X	X	X							
Collection	X	X	X	X						
On-site transportation	X	X	X	X						
Storage	X	X	X							
Off-side transportation	X	X	X		X					
Treatment and disposal	X	X	X			X				
Reuse	X	X	X			X	X			
Recycle	X	X	X			X				
Responsibility assignment	X	X	X		X	X	X			
Monitoring and supervision	X	X	X		X	X	X	X	X	X
Information, reporting, documentation	X	X	X		X	X	X	X	X	X
Environmental impact assessment or environmental management plan	X	X	X		X	X	X			
Planning for HCWM	X									
Planning for working safety & emergency response					X	X	X			
Planning for training	X				X	X	X			
Provision of HCWM equipment	X	X	X		X	X	X			
Provision of PPEs										
Appraisal of HCWM plan										
Appraisal of EIA or EMP								X	X	
Registry for owner of HZW generation	X	X	X							
Registry for HZWWM practitioner					X	X	X			
Licencing HZWWM practitioner								X		

<sup>1</sup> Refer to HCWM Regulations

<sup>2</sup> Refer to HZWWM Regulations

Inspection and assessment								X	X	X
Provision of sanction to violence								X		X

## 6. RECOMMENDATIONS

### 6.1 Revise and supplement some clauses of Healthcare waste management Regulations (promulgated in accordance with Decision No 43/2007/QĐ-BYT dated 3/12/2007)

- **Revise the regulation on HCW definition and classification:** Almost HCW streams are defined and classified by their hazards and ability of treatment, disposal or recycle. However, some HCW streams in HCWM regulations such as highly infectious waste (category 1C), commonly used in healthcare (category 2b) and general waste (group 5) are defined and classified by generating sources or activities. Such group and categories of waste should be re-defined and re-classified by their hazards and ability of treatment, disposal or recycle in line with principle of classification regulated in Environmental Protection Law and Decree on solid waste.
- **Revise and supplement regulations on color coding and labeling:** Color coding for general waste should be made clearer (green, blue e.g) to avoid unnecessary variation at facility level. The inscription of “infectious waste” should be labeled outside the yellow bags and bins, the inscription of “hazardous chemical waste” should be labeled outside black bags and bins for correlative waste. Many warning signs regulated in Vietnam standard TCVN 6707:2009 should be introduced in HCWM regulations. Other regulations on labeling in HCWM regulations and HzWM regulations (Circular 12/2011/BTNMT) should be harmonized.
- **Supplement regulation on collection and on-site transportation of liquid HzHCW.** HCWM regulations should refer fully requirements of plumbing code (promulgated in accordance with Decision No 47/1999/QĐ-BXD dated 21/12/1999 of Minister of Construction), and of Vietnam Standard TCVN 7957:2008 on design of external network and treatment facilities of sewerage. HCWM regulations should supplement regulations on devices and methods for collection and on-site transportation of hazardous liquid waste in health facilities.
- **Revise and supplement regulations on HCW interim storage.** The regulation on design of HCW interim storage house should be revised, regulation on storing and auxiliary equipments in HCWM interim storage house should be supplemented so that requirements for HCW storage facilities and equipments in HCWM regulations and HzWM regulations will be harmonized. Regulation on storage time of HCW should be revised so that hazardous chemical waste can be stored in longer time. Safe storage of hazardous chemical waste until local solution is found should be allowed.
- **Supplement regulations on off-site transportation of HCW.** Regulations on transportation vehicles, devices, HzW document regulated in HzWM Regulations



(in accordance with Circular 12/2011/TT-BTNMT) should be referred or supplemented into regulations of HCW off-site transportation in HCWM regulations.

- **Revise and supplement regulations on HCW treatment and disposal**

Regulation on treatment and disposal HZHCW outside health facility should be supplemented with the following items: (i) Requirements for HCW treatment facility serving as centralized or clustered facility so that those in HCWM regulations and HzWM regulations are harmonized; (ii) content of HCW treatment contract between health facility's director with off-site treatment facility's owner; (iii) selection of HCW treatment model as regulated in Official letter No 7164/BYT-KCB dated 20/10/2008 of Minister of Health enhancing HCW treatment and management.

HCWM Regulations should be supplemented with HzHCW treatment and disposal methods currently applied in Vietnam such as shredding, compacting, needle destroying and composting e.g. The names of treatment technologies such as wet thermal disinfection and high temperature incinerator should be made united. Regulation on treatment methods applied to each waste category should be revised so that landfill can be applied to many HzW categories, microwave irradiation can be applied for primary treatment of highly infectious waste, electrical needle destroyer can be applied to treat needles, and other specific methods can be applied to treat chemical waste. HCWM Regulations should be supplemented with regulations on treatment and disposal of secondary waste such as incinerator's bottom ash, sludge from wastewater treatment plant. For wastewater treatment, HCWM Regulations should allow hospitals locating side by side can share one wastewater treatment plant to save investment cost.

HCWM Regulations should be supplemented with requirements for area of HCW treatment and disposal in health facility; requirements for transportation, treatment and disposal of HCW in remote, resource limited areas. Existing national technical regulations and Vietnam standards on solid HCW incinerators and healthcare wastewater should be referred by and supplemented into HCWM Regulations.

- **Revise and supplement regulations on reduction and recycle.** In addition to general regulations on responsibility for prevention and reduction of HZHCW, HCWM Regulations should be supplemented with technical regulations on HZHCW prevention and reduction methods that are initially applied to major generator of HCW such as hospitals having 1000 beds or more. Because waste recycle is encouraged by Environmental Protection Law, Decree on solid waste and National strategy for integrated management of solid waste, HCWM Regulations should not ban HzHCW recycle (in clause 4) but supplement additional regulations on control of HzHCW recycle. Some recyclable waste such as kitchen waste, heavy metal contained waste should be supplemented into the list of recyclable waste.

- **Supplement regulations on working safety and emergency response.** HCWM Regulations should be supplemented with regulations on working safety and emergency response in the field of HCWM.

- **Revise, supplement regulations on responsibilities and obligations of stakeholders.** The following responsibilities and obligations should be supplementarily assigned to director of health facility: (i) to develop plan for working safety and to provide staff involving HCWM with PPEs; (ii) to develop plan for HCWM relating emergency response. Regulations on responsibilities and obligations of health facility's director in case of outsourcing for HCW treatment in HCWM Regulations should be harmonized to those in HzWM Regulations. HCWM Regulations should be supplemented with responsibilities and obligations of health facility's director and requirements for health facility treating HCW themselves.
- Responsibilities and obligations of HZWM practitioner that are regulated in HZWM Regulations should be referred and supplemented into HCWM Regulations so that such regulations are harmonized. HCWM Regulations should be supplemented with regulation on responsibilities of facility's owner collecting solid HCW inside health facility.
- **Refer to existing national technical regulations, Vietnam standards.** HCWM Regulations should have part listing current national technical regulations and Vietnam standards relating HCWM for reference.

## **6.2 Abrogate, revise and supplement some clauses in other legal documents relating HCWM**

- **Abrogate HCW treatment regulations.** The regulations on waste treatment in Hospital Regulations (promulgated in accordance with Decision No 1895/1997/BYT-QĐ dated 19/9/1997) should be abrogated officially.
- **Supplement and revise guidelines for designing general hospital (TCXDVN 365:2007).** The guidelines for designing general hospital (TCXDVN 365:2007) should be supplemented with requirements for storage area. The guidelines should remove requirements for on-site solid waste incinerator and encourage off-site treatment solution or on-site treatment by non-burn technologies
- **Supplement medical equipment list.** Medical equipment list should be supplemented with equipments for HCW transportation, storage, treatment and disposal.

## **6.3 Newly develop, revise some national technical regulations, Vietnam standards and practical guidelines**

- **Develop and promulgate National technical regulation on or technical guidelines for design, operation and maintenance of non-burn technologies (such as**

disinfection by wet thermal, disinfection by microwave) for infectious waste treatment.

- Develop and/or promulgate National technical regulation on or technical guidelines for design, operation and maintenance of healthcare wastewater treatment facilities.
- Develop and/or promulgate National technical regulation on or technical guidelines for air pollution control device.
- Develop and/or promulgate National technical regulation on or technical requirements for personal protective equipments used in HZHCWM including protective gloves, protective eyewear, protective respirator, protective footwear, industrial apron e.g.
- Harmonize technical requirements for hygienic landfill and concrete pits regulated in HCWM Regulations, HZWM regulations and Environmental Protection Law.
- Revise national technical regulations and Vietnam standard on solid HCW incinerator. The following items in Vietnam standard TCVN 7380:2004: technical requirements for solid HCW incinerator should be revised to harmonize to those in national technical regulation (QCVN 30:2010/BTNMT) on requirements for HzW incinerator: scope of application; standards for reference, requirements for temperatures, retention time, air pollution control, wastewater control, electricity safety, operational requirements and emergency response.
- Harmonize national technical regulation on quality of gas emission of solid HCW incinerator (QCVN 02:2008/BTNMT), national technical regulation on quality of gas emission of industrial waste incinerator (QCVN 30:2010/BTNMT) and industrial gas emission (QCVN 19:2009/BTNMT)

#### **6.4 Develop regulatory document guiding inter-sectoral coordination and cooperation between involving sectors in health environmental protection.**

In order to avoid overlap and enhance effectiveness, a regulatory document guiding inter-sectoral coordination and cooperation between sectors of environmental protection, health and public security in prevention and struggling environmental violence and crimes in healthcare (covering management of healthcare waste and other polluting sources in health facilities). Inter-sectoral inter-sectoral coordination and cooperation guidance should cover the following areas: information exchange; inspection and enforcement; communication and education on legal documents; capacity building for agencies involving health environmental protection.

**ANNEX:**  
**LIST OF LEGAL DOCUMENTS RELATING HEALTHCARE WASTE MANAGEMENT**

1. **National Assembly.** Environmental Protection Law, 2005
2. **Government.** Decision No 2149/QĐ-TTg dated 17/12/2009 of Prime Minister approving national strategy on integrated management of solid waste until 2025 and vision to 2050
3. **Government.** Decision No 1930/QĐ-TTg dated 20/11/2009 of Prime Minister approving development orientation of drainage and sewerage in urban and industrial areas in Vietnam until 2025 and vision to 2050
4. **Government.** Decree No 29/2011/NĐ-CP dated 18/4/2011 of Government regulating strategic environmental assessment, environmental impact assessment and environmental protection commitment
5. **Government.** Decree No 72/2010/NĐ-CP dated 8/7/2010 of Government regulating prevention, struggling against environmental crimes and violence
6. **Government.** Decree No 117/2009/NĐ-CP dated 31/1/2009 of Government regulating sanctions against legal violence in the field of environmental protection
7. **Government.** Decree No 35/2009/NĐ-CP dated 7/4/2009 of Government on organization and activities of Environmental and Natural Resource inspectors.
8. **Government.** Decree No 88/2007/NĐ-CP dated 28/5/2007 of Government on drainage and sewerage in urban and industrial areas
9. **Government.** Decree No 81/2007/NĐ-CP dated 23/5/2007 of Government regulating organization and unit in charge of environmental protection in State owned organizations and enterprises
10. **Government.** Decree No 80/2006/NĐ-CP dated 9/8/2006 of Government regulating details and guiding implementation of articles in Environmental Protection Law and Decree No 21/2008/NĐ-CP dated 28/2/2008 of Government revising, supplementing some articles in Decree 80/2006/NĐ-CP
11. **Government.** Decree No 59/2007/NĐ-CP dated 9/4/2007 of Government on solid waste management
12. **Ministry of Health.** Circular No 18/2009/TT-BYT dated 14/10/2009 of Ministry of Health guiding organization and implementation of infection control in health care facilities

13. **Ministry of Health.** Decision No 1873/QĐ-BYT dated 28/5/2009 of Minister of Health promulgating Plan for Environmental Protection in health sector in period of 2009 to 2015
14. **Ministry of Health.** Decision No 43/2007/QĐ-BYT dated 3/12/2007 of Minister of Health promulgating Regulations on healthcare waste management
15. **Ministry of Health.** Official letter No 7164/BYT-KCB dated 20/10/2008 of Minister of Health enhancing healthcare waste treatment and management
16. **Ministry of Health.** Decision No 3079 /QĐ-BYT dated 21/8/2008 of Minister of Health promulgating regulations on organization and activities of working safety system in health facilities
17. **Ministry of Health.** Decision No 1040/2003/QĐ-BYT dated 1/4/2003 of Minister of Health promulgating “Practical guidelines for hospital infection control”
18. **Ministry of Health.** Decision No 1895/1997/QĐ-BYT dated 19/9/1997 of Minister of Health promulgating Hospital regulations
19. **Ministry of Environment and Natural Resource.** Circular No 26/2011/TT-BTNMT dated 18/7/2011 of Ministry of Environment and Natural Resource regulating in details articles in Decree No 29/2011/NĐ-CP dated 18/4/2011 of Government regulating strategical environmental assessment, environmental impact assessment, environmental protection commitment.
20. **Ministry of Environment and Natural Resource.** Circular No 12/2011/TT-BTNMT dated 14/14/2011 of Ministry of Environment and Natural Resource quy định về quản lý chất thải nguy hại.
21. **Ministry of Environment and Natural Resource.** Circular No 04/2008/TT-BTNMT dated 18/9/2008 of Ministry of Environment and Natural Resource guiding development, approval or confirmation of environmental protection proposal and inspection of implementation of environmental protection proposal
22. **Ministry of Environment and Natural Resource.** Circular No 07/2007/TT-BTNMT dated 3/7/2007 of Ministry of Environment and Natural Resource guiding identification of the list of facilities causing severe environmental pollution.
23. **Ministry of Environment and Natural Resource.** Circular No 21/2009/TT-BTNMT, dated 05/11/2009 of Ministry of Environment and Natural Resource regulating technical-economical norm in surveying, assessing wastewater discharge and receiving capacity of water source.

24. **Ministry of Construction.** Decision No 957/QĐ-BXD dated 29/9/2009 of Minister of Construction promulgating cost norms of construction project management and consultancy.
25. **Ministry of Internal Affair and Ministry of Environment and Natural Resource.** Interministerial circular No 12/2007/TTLT-BTNMT-BNV dated 27/12/2007 of Ministry of Environment and Natural Resource, Ministry of Internal Affair guiding implementation of articles in Decree 81/2007/NĐ-CP dated 23/5/2007 of Prime Minister regulating organization and unit in charge of environmental protection.
26. **Ministry of Public Security and Ministry of Environment and Natural Resource.** Interministerial circular No 02/2009/TTLT-BCA-BTNMT dated 06 tháng 02 năm 2009 of Ministry of Public Security and Ministry of Environment and Natural Resource guiding cooperation in prevention, struggling environmental crimes and violences
27. Decision No. 170/QĐ-TTG of Prime Minister dated 07 Feb 2012
28. Decision No. 2038/QĐ-TTG of PM dated Nov 2011

## **National technical regulations and Vietnam standards**

- QCVN 01:2008/BTNMT – National technical regulations on construction projection
- QCVN 02:2008/BTNMT - National technical regulations on gas emission of healthcare waste incinerator
- QCVN 03:2008/BTNMT - National technical regulations on allowable limit of heavy metal in soil
- QCVN 05:2009/BTNMT: National technical regulations on ambient air quality
- QCVN 06:2009/BTNMT: National technical regulations on hazardous substances in ambient air
- QCVN 08:2008/BTNMT - National technical regulations on surface water quality
- QCVN 09:2008/BTNMT - National technical regulations on underground water quality
- QCVN 14:2008/BTNMT - National technical regulations on domestic wastewater quality
- QCVN 19:2009/BTNMT - National technical regulations on industrial gas emission in terms of dust and non-organic substances
- QCVN 24:2009/BTNMT - National technical regulations on industrial wastewater quality
- QCVN 25:2009/BTNMT - National technical regulations on wastewater from solid waste landfill
- QCVN 28:2010/BTNMT – National technical regulations on healthcare wastewater quality
- QCVN 30:2010/BTNMT – National technical regulations on gas emission of industrial waste incinerator
- TCVN 7957:2008: Sewerage – External network and facilities. Design standard
- TCVN 7380:2004: Healthcare waste incinerator – technical requirements
- TCVN 7381:2004: Healthcare waste incinerator – Appraisal and assessment methods
- TCVN 6706:2000: Hazardous waste – classification



- TCVN 6707:2009: Hazardous waste – Warning sign
- TCVN 6696:2009: Solid waste - Hygienic landfill – General requirements for environmental protection
- TCXDVN 320:2004: Hazardous waste landfill – Design standard
- TCXDVN 365:2007: General hospital – Design guidelines
  - A Consultation workshop held by national authorities regarding national policies on healthcare waste management

Date and location: Hanoi, 11 Nov 2011

Number of participants: 44

Participants are from UNDP, WHO, WB, Vietnam Environment Administration, Ministry of Natural resources and Environment, Ministry of Health; Ministry of Transportation; Ministry of Defence; Ministry of Construction; Ministry of Industry and Trade; Ministry of Police; URENCO; Viet Duc Hospital, Ninh binh General Hospital and local experts

Topics covered during the workshop: the analysis of policy and legislation/regulation on HCWM was discussed. They propose to develop new legislation and recommendation for amendment regulations

- There changes to national policies/regulations on healthcare waste management that were a direct/ indirect result of the project:

Circular No. 12/2011/TT-BTNMT dated 14 Apr 2011 by Ministry of Natural Resources and Environment on hazardous waste management;

Decision No. 170/QD-TTG dated 08 Feb 2012 by the Prime Minister on Approved master plan for hazardous healthcare solid waste treatment systems to 2025;

Decision No. 2038/QD-TTG dated 08 Feb 2012 by the Prime Minister on Approved master plan for healthcare waste treatment for 2011-2015 and orientation to the 2020;

Circular No 1/2012/TT-BTNMT dated 16/3/2012 by Ministry of Natural Resources and Environment on Provisions on establishment, appraisal, approval and Inspection, certification of the implementation detailed environmental protection proposal; establishment and Registration simple environmental protection proposal