



ENVIRONMENTAL MANAGEMENT BUREAU - DEPARTMENT OF ENVIRONMENT
AND NATURAL RESOURCES

Technical Guidelines for

Specific Categories of Treatment, Storage, and
Disposal (TSD) Facilities

2015

Technical Guidelines for Specific Categories of Treatment, Storage, and Disposal (TSD) Facilities

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Definition of Terms

“Disposal” refers to the discharge, deposit, dumping, or placing of hazardous waste on or in the land. A disposal facility is any site where hazardous waste is intentionally placed and where the waste will remain after a TSD stops operation [United States (US) Code, Title 42, Section 6903].

“Encapsulation” means physical immobilization of hazardous substances in a waste by enveloping the waste in a non-porous, impermeable material [Department of Environment and Natural Resources (DENR) Administrative Order (DAO) 2013-22].

“Hazardous Wastes” refers to: (a) 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 or disposal into or in transit through any part of the territory of the Philippines; and (b) by-products, side-products, process residues, spent reaction media, contaminated plant or equipment or other substances from manufacturing operations and as consumer discards of manufactured products which present unreasonable risk and/or injury to health and safety and to the environment (DAO 2013-22).

“Immobilization” means to render hazardous substances in a waste not likely to move by vaporization or by leaching into water bodies. It includes stabilization, solidification, and encapsulation (DAO 2013-22).

“PCB-containing Equipment” refers to any equipment containing dielectric oil with a PCB concentration greater than 2 parts per million (ppm) (PCB > 2 ppm).

“Reclamation” refers to the regeneration or processing of a hazardous waste to recover a usable product [40 Committee of the Federal Register (CFR) 261.1]

“Recycling” refers to the reuse or reclamation of hazardous wastes (40 CFR 261.1).

“Regeneration” refers to the processing of a hazardous waste to remove contaminants in a way that restores it to its usable original condition (US EPA, 2005).

“Reuse” refers to the use of a hazardous waste that is either employed as an ingredient in an industrial process to make a product or it is employed as an effective substitute for a commercial product (40 CFR 261.1).

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“Solidification” means physical immobilization of hazardous substances, through which the waste is consolidated to reduce the surface area of the waste available for vaporization or leaching (DAO 2013-22).

“Stabilization” means chemical immobilization of hazardous substances, through chemical bonds to an immobile matrix, or chemical conversion to immobile species, thereby reducing vaporization or leaching to the environment (DAO 2013-22).

“Storage” means holding of hazardous waste for a temporary period, at the end of which the waste is treated and disposed of (US EPA, 2011).

“Treatment” refers to any method, process, or technique designed to change the physical, chemical, or biological character or composition of any hazardous waste in order to neutralize such waste or to render such waste non-hazardous, amenable for recovery, amenable for storage, or reduced in volume (US EPA, 2011).

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1.0 INTRODUCTION

Republic Act (RA) 6969, otherwise known as the Toxic Substances and Hazardous and Nuclear Wastes Control Act of 1990, was enacted to respond to increasing problems associated with toxic chemicals and hazardous and nuclear wastes. Specifically, it mandates the control and management of the import, manufacture, process, distribution, use, transport, treatment, and disposal of toxic substances and hazardous and nuclear wastes in the country.

Its Implementing Rules and Regulations, Department of Environment and Natural Resources (DENR) Administrative Order (DAO) 2013-22: Revised Procedures and Standards for the Management of Hazardous Wastes (Revising DAO 2004-36), prescribes the governing rules and regulations for hazardous waste treatment, storage, and disposal (TSD) facilities. It also includes the categorization of TSD facilities.

This Technical Guideline provides the minimum protocols and standards on the categorization of TSD Facilities prescribed in Section 5.1 Categories of TSD Facilities of DAO 2013-22.

2.0 SCOPE AND COVERAGE

This Technical Guideline covers all TSD facilities that conduct onsite and/or offsite treatment, storage, and/or disposal of hazardous wastes.

3.0 CATEGORIZATION AND SPECIFICATIONS OF TSD FACILITIES

Hazardous Waste TSD Facilities shall be categorized as follows:

- Category A – Onsite Treatment and Disposal Facilities
- Category B – Thermal Treatment Facilities
- Category C – Disposal Facilities
- Category D – Recycling Facilities
- Category E – Chemical Treatment Facilities
- Category F – Storage Facilities
- Category G – Facilities that Decommission PCB-containing Equipment

Details of each category are discussed in the succeeding subsections.

Pursuant to RA 9279 or the Climate Change Act of 2009, all treatment, storage, and/or disposal activities to be conducted by TSD facilities shall be founded upon environmentally sound considerations and in accordance with the principle of sustainable development.

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3.1 CATEGORY A – ONSITE TREATMENT AND DISPOSAL FACILITIES

Facilities that conduct onsite treatment and disposal of hazardous wastes shall be classified as Category A TSD Facilities. These include those which treat and dispose hazardous wastes generated within the facility and employ or utilize technologies from Categories B to E and G.

3.2 CATEGORY B – THERMAL TREATMENT FACILITIES

Facilities that commercially treat hazardous wastes using thermal technologies (either burn or non-burn) shall be classified as Category B TSD Facilities. These include those which transform physical and/or chemical characteristics of the hazardous waste by thermal treatment prior to disposal. Table 1 presents the allowable hazardous wastes per thermal treatment method for Category B TSD Facilities.

Table 1. Allowable Hazardous Wastes per Thermal Treatment Method for Category B TSD Facilities

Type	Description	Allowable Hazardous Wastes
Pyrolysis	Treatment of hazardous waste in an ultra high temperature electrical arc in inert conditions to avoid combustion. This includes gasification and plasma arc technologies.	L403 Ozone-depleting Substances M505 Persistent Organic Pollutants (POPs) wastes
Autoclave (Hydroclave/ Pyroclave)	Treatment that uses heat, steam, and pressure in the processing of hazardous waste. This method is also referred to as sterilization.	M501 Pathological or infectious wastes
Thermal Decomposition (Thermolysis)	Decomposition initiated by heating leading to the chemical breakdown of hazardous wastes. The reaction is usually endothermic as heat is required to break chemical bonds in the compound undergoing decomposition. This method includes combustion, incineration (e.g., cement kiln; rotary or fluidized bed incinerator), thermal oxidation, vitrification, and irradiation (e.g., microwave, ultraviolet radiation).	A101 Wastes with cyanide D405 Chromium compounds E503 Explosive and unstable chemicals F601 Solvent-based F602 Inorganic pigments F603 Ink formulation F604 Resinous Materials H802 Grease Wastes L401 Wastes with specific halogenated toxic organic chemicals L402 Wastes with specific non-halogenated toxic organic chemicals L403 Ozone-Depleting Substances

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Type	Description	Allowable Hazardous Wastes
		L404 Polychlorinated Biphenyl (PCB) wastes M501 Pathological or infectious wastes M502 Asbestos wastes M503 Pharmaceuticals and drugs M504 Pesticides M505 POPs wastes
Thermal Evaporation	Treatment of hazardous wastes by heating to vaporize the contaminants into a gas stream that is collected, vented, condensed, or destroyed. Examples include thermal desorption for solid hazardous wastes and distillation for liquid hazardous wastes.	A101 Waste with cyanide D406 Lead and lead compounds D407 Mercury and mercury compounds F601 Solvent-based M505 POPs wastes

The technical specifications per hazardous waste thermal treatment method prescribed in Table 2 shall be used by Category B TSD Facilities.

Table 2. Technical Specifications per Thermal Treatment Method

Unit	Specifications
Pyrolysis	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Reaction Temperature	Must be equal to or higher than 350°C
Secondary Combustion Chamber	<ul style="list-style-type: none"> • Gases must undergo further treatment • Emissions subject to RA 8749, otherwise known as the Philippine Clean Air Act of 1999, standards
Particulate Removal Equipment	<ul style="list-style-type: none"> • Fabric filters or wet scrubbers must be installed • Ash and other by-products must be disposed in a sanitary landfill
By-product Disposal	Subject to the technical specifications prescribed in Table 3
Autoclave (Hydroclave/Pyroclave)	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Chamber	<ul style="list-style-type: none"> • Nickel clad chambers are required • Weldments, doors, and jacket shall be designed to meet the requirements of Boiler and Pressure Vessel Regulations • The door frame shall make up a welded end-ring of a material that is corrosion-resistant and is of sufficient strength

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Unit	Specifications
Controls	<ul style="list-style-type: none"> • Microcomputer control system is preferred • Should be mounted so as not to expose the sensitive components to steam and heat • Must document the minimum cycle alarms: Vessel Flood Alarm, Steam Table Deviation Alarm, Chamber Drain Probe Alarm, Under Temperature Alarm, and Over Temperature Alarm • Sterilizer must provide a manual control that can run a complete cycle, from start to finish manually, in the event of a power failure • Sterilizer should provide a tamper proof control with an access code that will prevent programming changes of the cycle parameters (time, temperature) with one or all of the programmed cycles
Doors	Must be designed with several independent mechanical and control features that provide for safety
By-product Disposal	Subject to the technical specifications prescribed in Table 3
<i>Thermal Decomposition (Thermolysis)</i>	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Combustion Chamber	Emissions subject to RA 8749 standards
By-product Disposal	Subject to the technical specifications prescribed in Table 3
<i>Thermal Evaporation</i>	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Evaporation Chamber	<ul style="list-style-type: none"> • Emissions subject to RA 8749 standards • Indirect fired units must be designed to control oxygen levels to minimize or eliminate oxidation of the contaminant • Direct fired units must be operated at a pressure lower than atmospheric
Vents	Must be designed to control organic emission with an annual average total organic concentration of 10 parts per million by weight
Leak Detection and Repair System	Must establish leak inspection, monitoring, and repair programs for equipment (e.g., valves, pumps, and compressors) that contains hazardous waste with at least 10 percent by weight organics
By-product Disposal	Subject to the technical specifications prescribed in Table 3

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3.3 CATEGORY C – DISPOSAL FACILITIES

Facilities that only accept hazardous wastes for final disposal shall be classified as Category C TSD Facilities. These include facilities that accept:

- Only inert or treated hazardous wastes for final disposal in a dedicated cell
- Hazardous wastes for final disposal such as solidified, encapsulated wastes, etc. under Class K of DAO 2013-22

Table 3 presents the acceptable hazardous wastes per disposal method for Category C TSD Facilities.

**Table 3. Allowable Hazardous Wastes per Disposal Method
for Category C TSD Facilities**

Type	Description	Allowable Hazardous Wastes
Sanitary Landfill	Excavated or engineered sites where non-liquid hazardous wastes are deposited for final disposal. These sites are selected and designed to minimize the chance of release of hazardous waste into the environment. Liquid wastes are not allowed to be disposed into a hazardous waste sanitary landfill.	K301 Solidified wastes K302 Chemically fixed and polymerized wastes K303 Encapsulated wastes M501 Pathological or infectious wastes* M502 Asbestos wastes M506 Waste electrical and electronic equipment (WEEE)
Surface Impoundments	Natural topographic depressions, man-made excavations, or diked areas formed primarily of earthen materials used for storage and treatment of liquid hazardous waste. Examples include holding, storage, settling, aeration pits, ponds, and lagoons.	M505 POPs wastes

*Note: *Only pathological or infectious wastes that have undergone treatment by a registered TSD facility may be disposed in a sanitary landfill.*

The technical specifications per hazardous waste disposal method prescribed in Table 4 shall be used by Category C TSD Facilities.

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Table 4. Technical Specifications per Disposal Method

Unit	Specifications
Sanitary Landfill	
Double Liner	Must consist of a top liner to prevent migration of hazardous constituents into the liner and a composite bottom liner consisting of a synthetic geo membrane and three feet of compacted soil material
Double Leachate Collection and Removal System (LCRS)	<ul style="list-style-type: none"> • Primary LCRS must be located above the top liner, while secondary LCRS must be located between the liners immediately above the bottom composite liner • Secondary LCRS, which also serves as the leak detection system, must be: <ul style="list-style-type: none"> ○ Designed with a bottom slope of at least one percent ○ Made of materials chemically resistant to the wastes placed in the unit ○ Able to remove the liquids • Must be designed to collect liquids in a sump and subsequently pump out those liquids
Others	Must have storm water run-on and runoff controls to prevent migration of hazardous constituents for at least a 25-year storm and a cover to prevent wind dispersal
Surface Impoundments	
Impoundment Unit	Must be designed to prevent the flow of liquids over the top of an impoundment (or overtopping) and ensure the structural integrity of any dikes
Double Liner	Must consist of a top liner to prevent migration of hazardous constituents into the liner and a composite bottom liner consisting of a synthetic geo membrane and three feet of compacted soil material
LCRS	<ul style="list-style-type: none"> • Must be located between the liners immediately above the bottom composite liner, enabling the LCRS to collect the largest amount of leachate, while also representing the most efficient place to identify leaks • Must be designed with a bottom slope of at least one percent, be made of materials chemically resistant to the wastes placed in the unit, and be able to remove the liquids • Must be designed to collect liquids in a sump and subsequently pump out those liquids

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3.4 CATEGORY D – RECYCLING FACILITIES

Facilities that recycle or reprocess hazardous wastes, which are not generated or produced at the facility, shall be classified as Category D TSD Facilities. These include facilities that:

- Recover valuable materials (i.e. used or waste oil, solvents, acids, alkalis, metals, etc.)
- Use hazardous wastes as input materials or as alternative fuel for industrial processes
- Remediate contaminated soil through physical, chemical, or biological treatment

Table 5 presents the permissible hazardous wastes per recycling method for Category D TSD Facilities.

Table 5. Permissible Hazardous Wastes per Recycling Method for Category D TSD Facilities

Type	Description	Allowable Hazardous Wastes
Recycling Constituting Disposal	Applying a hazardous waste directly to the land or incorporating it into a product that will be applied to the land, such as for landfilling, backfilling, and composting.	H802 Grease wastes
Combustion of Recovered or Alternative Fuel	Burning of hazardous wastes directly as an alternative fuel or using it as an ingredient or input material to produce fuel for industrial processes.	G704 Non-halogenated organic solvents H802 Grease wastes I101 Used or waste oil to I104
Reclamation	Reprocessing of hazardous wastes to recover a useable product or to remove contaminants in a way that restores the waste to a usable condition. Examples include electrokinesis, bioremediation (e.g., microbial reduction, phytoremediation), physical extraction (e.g., filtration, air stripping, dewatering), chemical extraction, and thermal extraction.	A101 Waste with cyanide D401 Selenium and its compounds D403 Barium and its compounds D404 Cadmium and its compounds D405 Chromium compounds D406 Lead compounds D407 Mercury and mercury compounds F601 Solvent-based F602 Inorganic pigments F603 Ink formulation

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Type	Description	Allowable Hazardous Wastes
		F604 Resinous Materials G703 Halogenated organic solvents G704 Non-halogenated organic solvents H802 Grease wastes I101 Used or waste oil to I104 L401 Wastes with specific halogenated toxic organic chemicals L402 Wastes with specific non-halogenated toxic organic chemicals M501 Pathological or infectious wastes M504 Pesticides M506 WEEE

The technical specifications per hazardous waste recycling method prescribed in Table 7 shall be used by Category D TSD Facilities.

Table 6. Technical Specifications per Recycling Method

Unit	Specifications
<i>Recycling Constituting Disposal</i>	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Hazardous Waste	Must be treated to reduce its toxicity and ability to leach into soil and ground water before the wastes are applied to land
<i>Combustion of Recovered or Alternative Fuel</i>	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Combustion Equipment	Must be permitted by the Department of Labor and Employment and meet performance and operating standards of boiler and industrial furnace regulations
By-product Disposal	Subject to the technical specifications prescribed in Table 3
<i>Reclamation</i>	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Reclamation Unit	Must be able to completely recover a usable product or restore it to a usable condition
By-product Disposal	Subject to the technical specifications prescribed in Table 3

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3.5 CATEGORY E – CHEMICAL TREATMENT FACILITIES

Facilities that accept and treat hazardous wastes, which are not generated or produced at the facility, using chemical treatment methods (i.e. immobilization, encapsulation, polymerization, or similar processes) shall be classified as Category E TSD Facilities. These include those that transform physical or chemical characteristics of the hazardous wastes by physico-chemical or thermo-chemical treatment prior to disposal into Category C TSD Facilities. Table 7 presents the allowable hazardous wastes per chemical treatment method for Category E TSD Facilities.

Table 7. Allowable Hazardous Wastes per Chemical Treatment Method for Category E TSD Facilities

Type	Description	Allowable Hazardous Wastes
Chemical Immobilization	Treatment that renders hazardous substances in a waste not likely to move by vaporization into the air or by leaching into soil, surface water bodies, or groundwater. It includes stabilization, solidification, encapsulation, and polymerization.	A101 Waste with cyanide D401 Selenium and its compounds D402 Arsenic and its compounds D403 Barium and its compounds D404 Cadmium and its compounds D405 Chromium compounds D406 Lead compounds D407 Mercury and mercury compounds D408 Fluoride and its compounds F604 Resinous materials M502 Asbestos wastes M503 Pharmaceuticals and drugs M504 Pesticides
Polymeric Filtration	Liquid/solid separation through the utilization of polymers, including ion-exchange resins, polymeric membranes, and molecular sieves.	A101 Waste with cyanide D401 Selenium and its compounds D402 Arsenic and its compounds D403 Barium and its compounds D404 Cadmium and its compounds D405 Chromium compounds D406 Lead compounds D407 Mercury and mercury compounds D408 Fluoride and its compounds E501 Oxidizing agents E502 Reducing agents

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Type	Description	Allowable Hazardous Wastes
		L401 Wastes with specific halogenated toxic organic chemicals L402 Wastes with specific non-halogenated toxic organic chemicals M504 Pesticides
Chemical Decomposition	Decomposition induced by the addition of one or more chemicals to a hazardous waste leading to the breakdown or change of the waste into other chemical compounds. It includes acid-base neutralization, oxidation, and reduction.	A101 Waste with cyanide B201 Sulfuric acid B202 Hydrochloric acid B203 Nitric acid B204 Phosphoric acid B205 Hydrofluoric acid B206 Mixture of sulfuric and hydrochloric acid B207 Other inorganic acid B208 Organic acid C301 Caustic soda C302 Potash C303 Alkaline cleaner C304 Ammonium hydroxide C305 Lime slurries D402 Arsenic and its compounds D405 Chromium compounds E501 Oxidizing agents E502 Reducing agents J201 Containers previously containing toxic chemical substances L401 Wastes with specific halogenated toxic organic chemicals L402 Wastes with specific non-halogenated toxic organic chemicals L403 Ozone-depleting substances L404 PCB wastes M501 Pathological or infectious wastes M502 Asbestos wastes M503 Pharmaceuticals and drugs M504 Pesticides

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Type	Description	Allowable Hazardous Wastes
Solvent Extraction	Liquid/solid separation wherein the contaminant in the hazardous waste is dissolved by a liquid chemical or supercritical fluid, reducing its concentration in the waste. The extracted solution containing the contaminant is usually collected for recycling, further treatment, or destroyed.	D403 Barium and its Compound D404 Cadmium and its compound D405 Chromium compounds D406 Lead compounds D407 Mercury and mercury compounds F601 Solvent-based M505 POPs wastes

The technical specifications per hazardous waste chemical treatment method prescribed in Table 8 shall be used by Category E TSD Facilities.

Table 8. Technical Specifications per Chemical Treatment Method

Unit	Specifications
Chemical Immobilization	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Immobilization Process	<ul style="list-style-type: none"> • Must either be chemical fixation or micro-encapsulation • Immobilization material must completely immobilize the waste and materials into which it may come into contact after placement
Product Disposal	<ul style="list-style-type: none"> • Confirm through Toxicity Characteristics Leaching Procedure (TCLP) results that the contaminants of concern are immobilized in the waste • Subject to the technical specifications prescribed in Table 3
Polymeric Filtration	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Treatment Unit	Discharges subject to RA 9275, otherwise known as the Philippine Clean Water Act of 2004, standards
By-product Disposal	Subject to the technical specifications prescribed in Table 3
Chemical Decomposition	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Treatment Unit	Discharges subject to RA 9275 standards
By-product Disposal	Subject to the technical specifications prescribed in Table 3
Solvent Extraction	
Storage Unit	Subject to the technical specifications prescribed in Table 9
Treatment Unit	Discharges subject to RA 9275 standards
By-product Disposal	Subject to the technical specifications prescribed in Table 3

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3.6 CATEGORY F – STORAGE FACILITIES

Facilities that store hazardous wastes, which were not generated from the facility awaiting transport for treatment, disposal, or export, shall be classified as Category F TSD Facilities. These include the following:

- Material Recovery Facilities
- Buildings that store containers, vessels, or tanks containing hazardous wastes
- Built tanks that store liquid hazardous wastes

The technical specifications per hazardous waste storage method prescribed in Table 9 shall be used by Category F TSD Facilities.

Table 9. Technical Specifications per Storage Method

Unit	Specifications
Containment Building	
Completely enclosed structure possessing four walls, a roof, and a floor that houses an accumulation of non-containerized hazardous wastes.	
Building	<ul style="list-style-type: none"> • Must be made of concrete and other man-made material • Must provide sufficient structural strength to prevent unit failure • Must be completely enclosed (floor/walls/roof) • Must have a decontamination area for personnel, equipment, and vehicles
Doors/ Windows	<ul style="list-style-type: none"> • Must not come into contact with the waste • Must have dust controls to minimize fugitive emissions
Contact Surfaces	Must be chemically compatible with the waste
Primary Barrier (floor)	<ul style="list-style-type: none"> • Must be made of concrete • Must be structurally sound and chemically compatible with the waste • Must be sloped toward liquid collection device (additional standard for managing liquids)
Secondary Barrier	<ul style="list-style-type: none"> • Must contain and allow for removal of accumulating liquid wastes • Required only for "wet areas" within the building
Containers	
Any portable device in which a material is stored. It encompasses all the different types of portable devices that may be used to handle hazardous wastes.	
Primary Containment	<ul style="list-style-type: none"> • Must be in good condition • Must be made of or lined with materials that will not react with and are otherwise compatible with the waste in the container • Containers which store hazardous waste with low vapor pressures must be equipped with, at the very minimum, a fixed cover

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Unit	Specifications
	<ul style="list-style-type: none"> Containers which store hazardous waste with high vapor pressures must be vapor-tight and be placed in an enclosure vented to a control device or using a closed-vent system that vents emissions from the storage unit to a control device
Secondary Containment	<ul style="list-style-type: none"> Base must be free of cracks or gaps and must be sufficiently impervious to contain leaks, spills, and accumulated precipitation Base must be sloped so that liquids resulting from releases can drain and be removed. This is not necessary, however, if the container is elevated (on pallets) or otherwise protected from contacting accumulated liquids Must have the capacity to contain at least 10 percent of the volume of the containers or 100 percent of the volume of the largest container, whichever is greater Storm water must be prevented from entering the system unless the collection system has sufficient capacity to contain any runoff in addition to the capacity requirements Any waste that has spilled or leaked into the secondary containment area or any accumulated precipitation can be removed in a timely manner to prevent overflow
Tanks	
Receptacles for holding hazardous wastes that are stationary while in use.	
Primary Containment	<ul style="list-style-type: none"> Must be in good condition Must be designed with an adequate foundation and structural support Tank systems or components made wholly or partly of metal must be designed and installed with adequate corrosion protection if the system will be in contact with soil or water Seams and connections must be sealed adequately and pressure controls must be installed if necessary Tanks which store hazardous waste with low vapor pressures must be equipped with, at the very minimum, a fixed cover Tanks which store hazardous waste with high vapor pressures must be vapor-tight and be placed in an enclosure vented to a control device or using a closed-vent system that vents emissions from the storage unit to a control device
Secondary Containment and Leak Detection	<ul style="list-style-type: none"> Must be designed and installed so that no waste is released to the surrounding soil, groundwater, or surface water Must be equipped with a leak detection system capable of detecting failure in either the primary or secondary containment structures

Moreover, all hazardous wastes shall be properly stored and labeled in accordance to the storage and labeling requirements prescribed by DAO 2013-22.

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3.7 CATEGORY G – FACILITIES THAT DECOMMISSION PCB-CONTAINING EQUIPMENT

Facilities that conduct decommissioning of PCB-containing equipment shall be classified as Category G TSD Facilities. These include those that:

- Drain PCB oil and/or PCB-contaminated oil from equipment in preparation for storage, treatment, and/or disposal
- Dismantle PCB-containing equipment in preparation for storage, treatment, and/or disposal

These facilities shall ensure that draining and/or dismantling activities shall not result in spills or uncontrolled discharges of PCBs. Furthermore, all components of the equipment as well as the generated wastes shall be properly stored and transported to a registered TSD Facility for PCB Wastes in accordance with the requirements of DAO 2013-22.

4.0 FINES AND PENALTIES

Any person, both natural and juridical, found violating or failing to comply with any Order or Decision of the Department and/or the Pollution Adjudication Board or any provision of this Technical Guideline shall be liable under Section 14 of RA 6969.

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References

- Department of Environment and Natural Resources (DENR) Administrative Order No. 2013-22 Revised Procedures and Standards for the Management of Hazardous Wastes (Revising DAO 2004-36).
- Environment and Heritage Service. (2004). *BPEO for the Management of Waste Asbestos*. Available:
<http://www.doeni.gov.uk/nia/bpeoasbestos.pdf>
- Environmental Control Section. (2013). *Technical Guideline: Disposal of Hazardous Waste*. Dubai. Available:
<https://login.dm.gov.ae/wps/wcm/connect/ca284b23-b2e0-478a-bf31-7ef7a1167f0d/ECS+%281%29+-+E.pdf?MOD=AJPERES>
- Hawley, E. L., Deeb, R. A., Kavanaugh, M. C., & Jacobs, J. R. (2004). Treatment Technologies for Chromium(VI). In *Handbook on Chromium* (pp. 273-308). Available:
<http://www.yarbis1.yildiz.edu.tr/web/userAnnouncementsFiles/dosya446b3cc155260ae41d65adfd15794f74.pdf>
- Health Care Without Harm. (2001). *Non-Incineration Medical Waste Treatment Technologies*. Available:
http://noharm.org/lib/downloads/waste/Non-Incineration_Technologies.pdf
- Integrated Pollution Prevention and Control. (2006). *Reference Document on Best Available Techniques for the Waste Treatments Industries*. European Commission. Available:
http://eippcb.jrc.ec.europa.eu/reference/BREF/wt_bref_0806.pdf
- Interstate Technology and REgulatory Council. (2 September 1998). *Technical Guidelines for Onsite Thermal Desorption of Solid Media and Low Level Mixed Waste Contaminated with Mercury and/or Hazardous Chlorinated Organics*. Available:
<http://www.itrcweb.org/Guidance/GetDocument?documentID=98>
- Japan Environment Corporation (JEC). (1972). *Report on Concentrated Liquid Cyanide Waste Treatment Technology*. Available:
<http://www.jesconet.co.jp/eg/pdf/JECCWT.pdf>

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- Kiepper, B. (2001). *Characterization of the Generation, Handling and Treatment of Spent Fat, Oil, and Grease (FOG) from Georgia's Food Service Industry*. Available: http://www.cwwa.ca/pdf_files/FOG%20-%20UofGeorgia%20Report%20Final.pdf
- Li, L. (n.d.). *Remediation Treatment Technologies: Reference Guide for Developing Countries Facing Persistent Organic Pollutants*. Available: http://www.unido.org/fileadmin/import/85023_07_Treatment_Tech_Reference_Guide_for_POPs_LLi.pdf
- Moore, L., & Mahmoudkhani, A. (2011). Methods for Removing Selenium from Aqueous Systems. *Proceedings Tailings and Mine Waste*. Available: https://circle.ubc.ca/bitstream/id/136281/Moore_L_et_al_TMW_2011.pdf
- National Institute of Building Sciences. (February 2010). *Unified Facilities Guide Specifications, Section 02 53 16, Remediation of Contaminated Soils by Thermal Desorption*. The Whole Building Design Guide. Available: <https://www.wbdg.org/ccb/DOD/UFGS/UFGS%2002%2053%2016.pdf>
- Nemerow, N. (2007). *Industrial Waste Treatment: Contemporary Practice and Vision for the Future*. Elsevier Inc. Available: <http://booksite.elsevier.com/samplechapters/9780123724939/01~FrontMatter.pdf>
- North American Metals Council. (2010). *Review of Available Technologies for the Removal of Selenium from Water*. CH2M HILL, Inc. Available: <http://www.namc.org/docs/00062756.PDF>
- Office of Technology Assessment. (1983). *Technologies and Management Strategies for Hazardous Waste Control*. Washing D.C.: U.S. Government Printing Office. Available: <http://ota-cdn.fas.org/reports/8323.pdf>
- United States Environmental Protection Agency. (2003). *Arsenic Treatment Technology Evaluation Handbook for Small Systems*. Available: http://water.epa.gov/drink/info/arsenic/upload/2005_11_21_arsenic_handbook_arsenic_treatment-tech.pdf

Technical Guidelines for Specific Categories of Treatment, Storage, and Disposal (TSD) Facilities

United States Environmental Protection Agency. (1994). PCB Q&A Manual. Available:

<http://www.epa.gov/osw/hazard/tsd/pcbs/pubs/manual.pdf>

Rao, K. S., Mohapatra, M., Anand, S., & Venkateswarlu, P. (2010). Review on Cadmium Removal from Aqueous Solutions . *Internation Journal of Engineering, Science and Technology*, 81-103. Available:

http://www.ijest-ng.com/vol2_no7/ijest-ng-vol2-no7-pp81-103.pdf

U.S. Code, Title 42, Section 6903.

U.S. Environmental Protection Agency. (October 2005). *Guidance for Identifying Incidental Processing*. Available:

[http://yosemite.epa.gov/osw/rcra.nsf/ea6e50dc6214725285256bf00063269d/87BF25FB0D76EB888525709E00453487/\\$file/14748.pdf](http://yosemite.epa.gov/osw/rcra.nsf/ea6e50dc6214725285256bf00063269d/87BF25FB0D76EB888525709E00453487/$file/14748.pdf)

U.S. Environmental Protection Agency. (2007). *Treatment Technologies for Mercury in Soil, Waste, and Water*. National Service Center for Environmental Publications. Available:

<http://www.epa.gov/tio/download/remed/542r07003.pdf>

U.S. Environmental Protection Agency. (2011). *Resource Conservation and Recovery Act (RCRA) Irientation Manual, Section III, Chapter 5: Regulations Governing Treatment, Storage, and Disposal Facilities*.

Available: <http://www.epa.gov/osw/inforesources/pubs/orientat/>

United Nations Office on Drugs and Crime. (2011). *Guidelines for the Safe handling and disposal of chemicals used in the illicit manufacture of drugs*. New York: United Nations Publication. Available:

http://www.unodc.org/documents/scientific/Disp.Manual_English.pdf

Vigneswaran, S., & Kandasamy, J. (n.d.). *Sludge Treatm\ent Technologies. Water and Wastewater Treatment Technologies*. Available:

<http://www.eolss.net/sample-chapters/c07/e6-144-15.pdf>

Young, C. A., & Jordan, T. S. (n.d.). Cyanide Remediation: Current and Past Technologies. *Proceedings of th 10th Annual Conference on Hazardous Waste Research*, 104-129. Available:

<https://www.engg.ksu.edu/HSRC/95Proceed/young.pdf>

40 Committee of Federal Register (CFR) 261.1.