



Ministry of Housing & Urban Affairs
Govt. of India

CAPACITY BUILDING PROGRAMME ON IMPLEMENTATION OF WASTE MANAGEMENT RULES, 2016



Ministry of Environment, Forest &
Climate Change, Govt. of India



HAZARDOUS WASTE MANAGEMENT RULES-2016



Central Pollution Control Board



National Productivity Council



HAZARDOUS & OTHER WASTES (MANAGEMENT AND TRANSBOUNDARY MOVEMENT) RULES, 2016

**Overview of
Hazardous &
Other Waste
Management**

**Features of
Hazardous
Waste
Rules 2016**

**Duties of
stakeholders**

**Management &
Recycling of
Hazardous waste**

Your Guide For
HAZARDOUS & OTHER WASTES

1st Edition
June, 2019

Preface

National Productivity Council (NPC) presents the Tool Kit is pleased to present to you the 'Toolkit for implementation of Hazardous Waste Management rules, 2016'. This toolkit has been crafted specially for reference for by all the the stakeholders involved in the generation, collection, storage, transportation, treatment & disposal of Hazardous waste. Further, it is published as a reference for citizens , institutions interested to explore and understand the key features of the rules notified in 2016.

The tool kit describes Hazardous Waste Classification and Operatorss' Requirements, aspects of Import & Export of Hazardous & Other Wastes, Record keeping, Hazardous Waste Generator Training Requirements, Disposal of Hazardous waste. It provides useful tips, FAQs, do's and don'ts, methods and practices that should be followed in the Hazardous solid waste management process.

The toolkit has been brought together by a team of good technocrats and environmentalists, including from various regulatory authorities in the country. It has been furthercarefully reviewed by experts.

This toolkit also provide Standard Operating Procedures (SOP)s for management of available specific Hazardous Waste.

NPC would welcome any suggestions and feedback on this publication so that 'The Toolkit' becomes a usefultrusted companion & compendium for reference by stakeholders in Indiaand part of all Stakeholders.

K. D. Bhardawaj

Regional Director, Delhi

National Productivity Council

Compiled & Edited by:



National Productivity Council

Note: 1. All pictures used in the toolkit are from various sources, which have been duly referred to.
2. This publication is purely for education purpose and not for commercial purpose.

ABBREVIATIONS

APCD – Air Pollution Control Device

CHWTSDF – Common Hazardous Waste Treatment, Storage & Disposal Facility

CPCB – Central Pollution Control Board

DRE – Destruction & Removal Efficiency

EPA – Environment Protection Agency

ETP – Effluent Treatment Plant

EU – European Union

FAQ – Frequently Asked Questions

GHG – Green House Gases

HOWMTM – Hazardous & Other Wastes Transboundary Movement

HW – Hazardous Waste

KLDP – Kilo Liter Per Day

LQG – Large Quantity Generator

MOEF&CC – Ministry of Environment, Forest & Climate Change

MTA – Million Tons per Annum

PPE – Personal Protection Equipment

SPCB – State Pollution Control Board

SOP POP – Standard Proposed Operating Procedure Practice

SLF – Secured Landfill Facility

SQG – Small Quantity Generator

STLC – Soluble Threshold Limit Concentration

TCLP – Toxicity Characteristic Leaching Procedure

TTLC – Total Threshold Limit Concentration

TPA – Tonnes Per Annum

TSDF – Treatment, Storage & Disposal Facility

USEPA – United States Environment Protection Agency

Table of Contents

S. No.	Content	Page No.
1	Introduction	1
1.1	Hazardous Waste Policy Framework	4
1.2	Hazardous Waste Definition	4
2.	Hazardous Waste Classification and Operators Requirements	5
2.1	How to Identify Hazardous & Other Wastes	8
2.2	Responsibilities of Occupier	9
2.3	Storage Requirements	10
2.4	Labeling Requirements	11
2.5	Hazardous Waste Accumulation/Storage Area	11
2.6	Hazardous Waste Compatibility	12
2.7	Container Management	15
3	Import & Export of Hazardous & Other Wastes	15
3.1	Responsibilities of Importer	16
3.2	Procedure for Export of Hazardous & Other Wastes from India	16
3.3	Illegal Traffic	16
4	Record keeping	18
5	Hazardous Waste Generator Training Requirements	18
5.1	Training Requirements for Small Quantity Generators (SQG)	18
5.2	Training Requirements for Large Quantity Generators (LQG)	19
5.3	Training Plan	19
6	Hazardous & Other Waste Management	20
6.1	Waste Minimization/Cleaner Production	22
6.2	Co-processing of Hazardous Waste	24
6.2.1	Benefits of Co-processing in Cement Industry	25
6.2.2	Material & Energy Recovery	26
6.2.3	Best Practices of Hazardous Waste utilization other than Co-processing	29
7	Disposal	30
7.1	Quality Management System	31
7.2	Setting up of Common Hazardous Waste Treatment, Storage and Disposal Facilities (CHWTSDF)	32

8	Hazardous Waste Emergency/Contingency Plan	38
8.1	General Requirements	38
8.2	Use of Contingency Plan	38
8.3	Emergency Communication	39
8.4	Emergency Response Equipment	39
	Appendix – A: Important Definitions	40
	Appendix – B: List of Hazardous Characteristics as per Rules, 2016	43
	Appendix – C: Proposed Operating Practices	47
	Appendix – D: Frequently Asked Questions (FAQs)	77
	Appendix – E: Do’s and Don’ts	85
	Appendix – F: Forms as per Rules, 2016	88

1.0 INTRODUCTION

Rapid industrialization in last few recent decades have led to the depletion of natural resources and increase in pollution in the country. As part of economic development, this industrialization has also led to generation of huge quantities of hazardous waste which causes severe environmental problems. These industrialization has also led, apart from economic development, to the generation of huge quantities of hazardous waste which causes sewer environmental problems. Therefore, scientific treatment and systematic disposal of generated waste is a necessity.

Hazardous waste is a complex problem as it poses threat not only to the environment but also to the human health. It requires sophisticated and specialized treatment due to the presence of a mixture of chemicals and substances. Basically, the hazardous wastes are generated because of the following reasons:

- a) Use of Hazardous Substances:- Generally, most of the hazardous wastes are generated during the production and consumption and production of chemicals. The generation of such wastes is increasing with the increase in the demand of the consumer goods.
- b) Use of Inappropriate Technologies:- Many industries, in particular small & medium enterprises (SMEs) use outdated or obsolete technologies due to economic and technical constraints. As a result the resource conversion is not optimum, resulting in high & more toxic and/or hazardous wastes.
- c) End of Pipe Treatment of Effluent/Emissions:-The treatment of wastewater streams and gaseous emissions to meet the standards, result into residues that contain hazardous constituents.

Ministry of Environment, Forest and climate Change (MoEF & CC) formerly known as Ministry of Environment and Forest (MoEF) promulgated Hazardous Waste (Management and Handling) Rules, 1989, under the provision of the Environment Protection Act, 1986. In September 2008 the said rules were amended and new rules entitled "Hazardous waste (Management, Handling and Transboundary Movement) Rules, 2008" were promulgated. These rules were further amended in the year 2009 & 2010 for proper management and handling of hazardous waste in the country (CPCB, 2010-2011). India has also ratified the Basel convention on transboundary movement of hazardous waste in the year 1992 and is a signatory to the convention (Dutta SK, 2006). It is an international treaty that was designed to reduce the movements of hazardous waste between nations, except where it is perceived to be in accordance with principles of environmentally sound management. The rules have been further amended recently, entitled Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, to include other wastes such as Waste tyre, paper waste, metal scrap, used electronic items, etc.

As per the CPCB estimates in 2010 latest statistics, about 7.66 million tonnes per year of hazardous waste is generated from about 40,722 industries. About 3.39 MTPA (44.3%) landfillable; 3.61 MTPA (47.2%) recyclable and 0.65 MTPA (8.5%) is incinerable waste, out of the total hazardous

waste generated in the country. About 83% of total hazardous waste is generated from in seven states viz.; Gujarat, Maharashtra, Tamil Nadu, Andhra Pradesh, West Bengal and Chattisgarh. There are about 29 Common Secured Landfill Facilities in 16 states and 14 Common Incinerators in 7 states in order to manage hazardous wastes in environmentally sound manner.

As per the Compendium of Environmental Statistics India, 2016, about 90% of the total hazardous waste generated in the country is being contributed by ten (10) states and out of these, the industries in three states viz.; Maharashtra, Gujarat and Andhra Pradesh contribute about 60% of total hazardous waste. Most of the hazardous waste is being generated from chemical production & metal processing industries apart from the treatment of wastewater and flue gases.

The state wise hazardous waste generation along with percentage recyclable is presented in the following Table – 1 and Figure – 1 & 2.

Table – 1.0 : State wise Hazardous Waste Generation in India

Hazardous Waste Generation in India (MTPA)		
States	HW Generation(MTPA)	% Recyclable
Maharashtra	1.81	58.4
Gujarat	1.79	32.2
Andhra Pradesh	1.09	57.9
Rajasthan	0.79	23.9
Tamil Nadu	0.4	34.8
Madhya Pradesh	0.37	88.8
Chattisgarh	0.29	68.4
Jharkhand	0.24	86.1
Uttar Pradesh	0.21	76
West Bengal	0.2	74.5

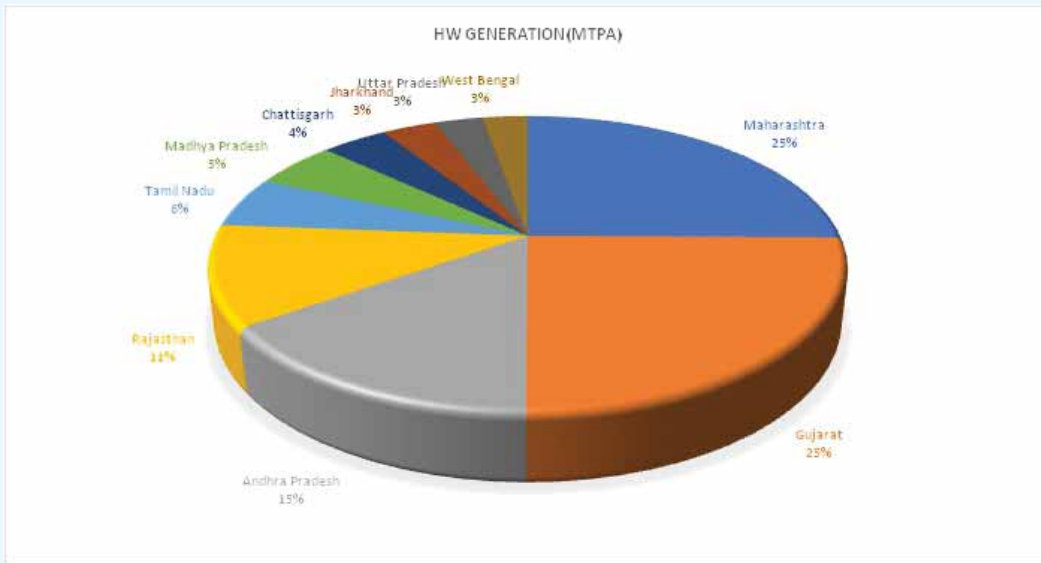


Figure – 1.0: Showing Hazardous Waste Generation in India

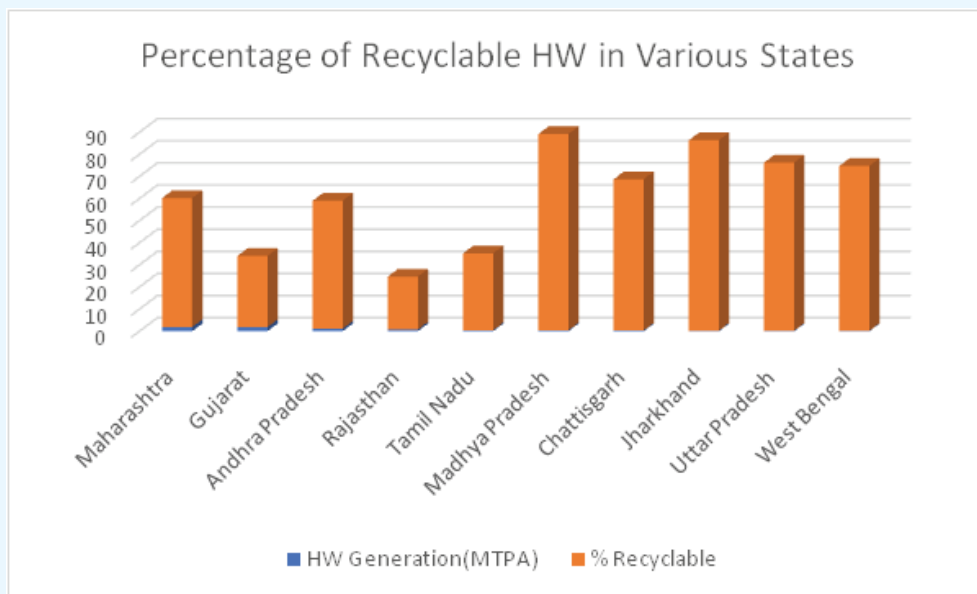


Figure – 21.1 : Percentage of Recyclable waste in various States.

This Hazardous & Other Wastes Rules, 2016, Compliance Tool Kit is intended to assist various stakeholders in understanding how to comply with the regulations governing hazardous waste management in India and to manage hazardous wastes in environmentally sound manner.

The tool kit provides the Do's and Don'ts with respect to management of hazardous waste. It provides several proposed operating practices general standard operating procedures (PSOPs) that can be customized and adapted as per the individual requirement.

1.1 HAZARDOUS WASTE POLICY FRAMEWORK

Hazardous waste was first regulated in 1989 through Hazardous Waste (Management & Handling) Rules, 1989, which subsequently were amended in 2008 to incorporate Basel Convention provisions and lastly recently again in 2016. The Hazardous Waste Management regulations have undergone sea change since its first promulgation in 1989 to take care of requirements of various stakeholders from time to time. Hazardous Waste is regulated by the following agencies in India:

- Ministry of Environment, Forest & Climate Change, Government of India;
- Central Pollution Control Board;
- State Pollution Control Boards and
- Pollution Control Committees

1.2 HAZARDOUS WASTE DEFINITION

What is Waste?

“Waste” means materials, that are not products or byproducts, for which the generator has no further use for the purposes of production, transformation or consumption. Wastes are the materials that may be generated during, the extraction of raw materials, the processing of raw materials into intermediates and final products, the consumption of final products, and through other human activities and excludes residuals recycled or reused at the place of generation. By-product means a material that is not intended to be produced but gets produced in the production process of intended product and is used as such.

What is Hazardous Waste?

The primary purpose for a hazardous waste definition is to help the stakeholders establish whether waste is hazardous or potentially hazardous. As per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016:

“Hazardous waste” means any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other waste or substances and shall include:

- Wastes specified in column (3) of Schedule-I;
- Wastes having equal to or more than the concentration limits specified for the constituents in Class A and Class B of Schedule-II or any of the characteristics as specified in Class C of Schedule II; and
- Wastes specified in Part-A of Schedule-III in respect of import or export of such wastes or the wastes not specified in Part A but exhibits hazardous characteristics specified in Part-C of Schedule-III

The possible effects of hazardous waste are uncertain and vary greatly, depending on the nature and volume of the substance and the receiving environment. However, if managed improperly, the possible effects from toxic and hazardous substances on humans, animals and plants include:

“...mortality; adverse effects on reproduction; causing cancer; causing deformities and genetic mutations; causing other diseases; accumulation in the environment and living tissue (this may have consequences in the food chain); indirect effects on ecosystems”.

2.0 HAZARDOUS WASTE CLASSIFICATION & OPERATOR REQUIREMENTS

Waste is considered a hazardous waste based on properties that make it potentially dangerous or harmful to human health or the environment. It can be a liquid, solid, contained gases, or discarded unused commercial product, or discarded used material.

Various characteristics have been defined under Class 'C' of Schedule II and Part 'C' of Schedule III of Hazardous and Other wastes, Rules, 2016. Waste is considered hazardous if it shows one or more some of the following characteristics:

Flammable or Ignitable: A waste exhibits the characteristic of flammability or ignitability if a representative sample of the waste has any of the following properties, namely:-

(i) flammable liquids, or mixture of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc; but not including substances or wastes otherwise classified on account of their dangerous characteristics), which give off a flammable vapour at temperature less than 60°C.

This flash point shall be measured as per ASTM D 93-79 closed-cup test method or as determined by an equivalent test method published by Central Pollution Control Board;

(ii) it is not a liquid and is capable, under standard temperature and pressure, of causing fire through friction, absorption of moisture or spontaneous chemical changes and, when ignited, burns vigorously and persistently creating a hazard;

(iii) it is an ignitable compressed gas;

(iv) It is an oxidizer and for the purposes of characterisation is a substance such as a chlorate, permanganate, inorganic peroxide, or a nitrate, that yields oxygen readily to stimulate the combustion of organic matter.

Easily catches on fire. Examples include: petroleum products, pesticides, solvents, etc.

Corrosive: A waste exhibits the characteristic of corrosivity if a representative sample of the waste has either of the following properties, namely:-

(i) it is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5;

(ii) it is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm per year at a test

temperature of 55 °C;

- (iii) it is not aqueous and, when mixed with an equivalent weight of water, produces a solution having a pH less than or equal to 2 or greater than or equal to 12.5;
- (iv) it is not a liquid and, when mixed with an equivalent weight of water, produces a liquid that corrodes steel (SAE1020) at a rate greater than 6.35 mm per year at a test temperature of 55 °C.

Note:

For the purpose of determining the corrosivity, the Bureau of Indian Standard 9040 C method for pH determination, NACE TM 01 69 : Laboratory Corrosion Testing of Metals and EPA 1110A method for corrosivity towards steel (SAE1020) to establish the corrosivity characteristics shall be adopted.

Causes deterioration, etching, or eating away of body tissue and other surfaces that it touches. Examples include: acids & alkalis.

Toxic- A waste exhibits the characteristic of toxicity, if, :-

- (i) the concentration of the waste constituents listed in Class A and B (of this schedule) are equal to or more than the permissible limits prescribed therein;
- (ii) it has an acute oral LD50 less than 2,500 milligrams per kilogram;
- (iii) it has an acute dermal LD50 less than 4,300 milligrams per kilogram;
- (iv) it has an acute inhalation LC50 less than 10,000 parts per million as a gas or vapour;
- (v) it has acute aquatic toxicity with 50% mortality within 96 hours for zebra fish (*Brachidanio rerio*) at a concentration of 500 milligrams per litre in dilution water and test conditions as specified in BIS test method 6582 – 2001.
- (vi) it has been shown through experience or by any standard reference test- method to pose a hazard to human health or environment because of its carcinogenicity, mutagenicity, endocrine disruptivity, acute toxicity, chronic toxicity, bio-accumulative properties or persistence in the environment.

Toxic: Poisonous and may cause injury or death if swallowed, inhaled, or absorbed through the skin. Examples include: insecticides, paints, heavy metals.

Reactive or explosive- A waste exhibits the characteristic of reactivity if a representative sample of the waste it has any of the following properties, namely:-

- (i) it is normally unstable and readily undergoes violent change without detonating;
- (ii) it reacts violently with water or forms potentially explosive mixtures with water;
- (iii) when mixed with water, it generates toxic gases, vapours or fumes in a quantity sufficient to present a danger to human health or the environment;

- (iv) it is a cyanide or sulphide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapours or fumes in a quantity sufficient to present a danger to human health or the environmental;
- (v) it is capable of detonation or explosive reaction if it is subjected to a strong initiating source or if heated under confinement;
- (vi) it is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure;
- (vii) it is a forbidden explosive.

Reactive: Reactive wastes are unstable under normal conditions. They can cause explosions or release toxic fumes, gases, or vapors when heated, compressed, or mixed with water. Examples include: phosphorous, sodium metal.

Substances or Wastes liable to spontaneous combustion - Substances or Wastes which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up on contact with air, and being then liable to catch fire.

Substances or Wastes which, in contact with water emit flammable gases- Substances or Wastes which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

Oxidizing - Substances or Wastes which, while in themselves not necessarily combustible, may, generally by yielding oxygen cause, or contribute to, the combustion of other materials.

Organic Peroxides - Organic substances or Wastes which contain the bivalent O–O structure, which may undergo exothermic self-accelerating decomposition.

Poisons (acute) - Substances or Wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact.

Infectious substances - Substances or Wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animals or humans.

Liberation of toxic gases in contact with air or water - Substances or Wastes which, by interaction with air or water, are liable to give off toxic gases in dangerous quantities.

Eco-toxic- Substances or Wastes which if released, present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation or toxic effects upon biotic systems or both.

Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above.

Note: Products can show more than one characteristic, for example wastes from dyes & dye intermediate, distillation residues may be toxic, flammable and corrosive. In such cases, one need to put symbol for the most predominant constituent in the waste.

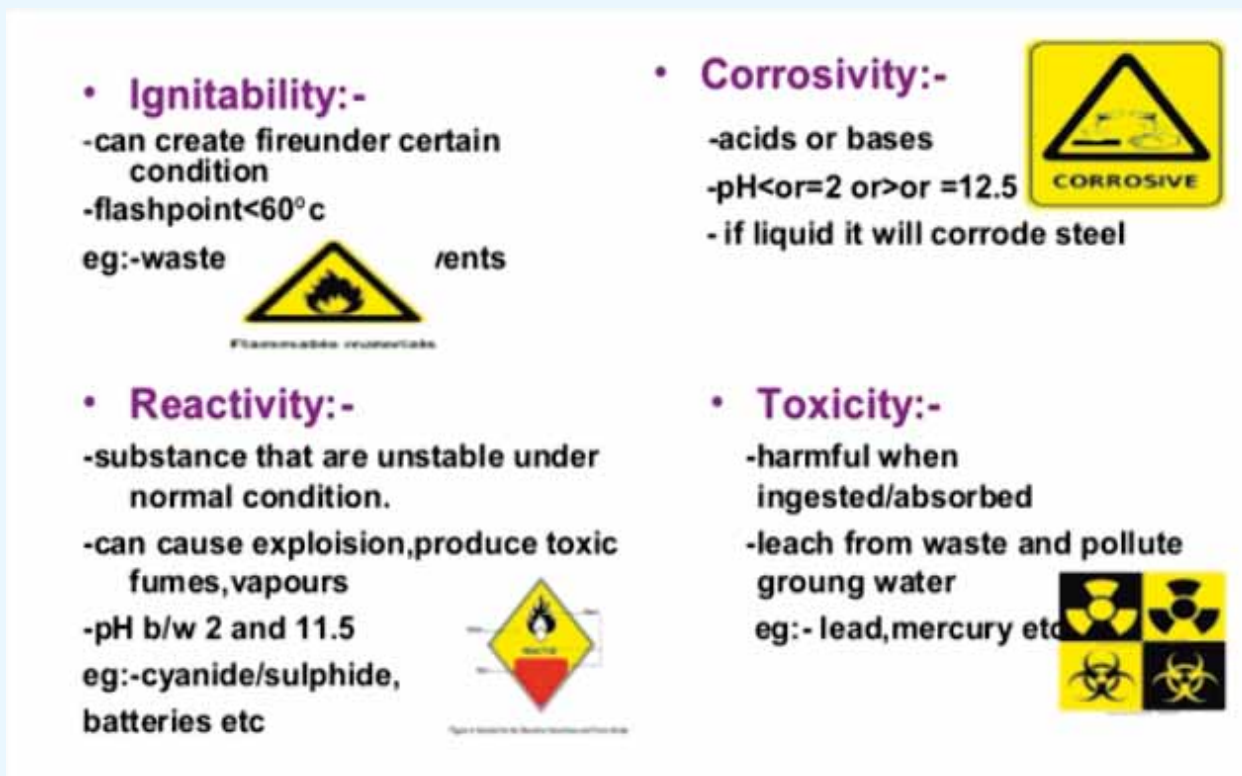


Figure – 2.0: Sample symbolic representation showing of selected Characteristics of Hazardous Wastes.

2.1 How to Identify Hazardous Waste?

Identification of waste as hazardous is a first and foremost aspect in hazardous waste management. An occupier must first identify whether the waste they generate is a hazardous waste. Hazardous waste can be difficult to identify. It may not be immediately obvious that the waste you are handling is potentially hazardous. Figure 1 below is designed to help you determine whether or not the waste you are managing is hazardous as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

Note: An occupier can also choose to rely on professional expertise to determine whether the waste is a hazardous waste or by sending the waste to a certified laboratory for testing and analysis.

Tips on waste Identification

Waste generators generally have two options when identifying waste. They can apply "process knowledge" or information about the raw materials and processes generating the waste. Common sources of generator knowledge include:

- Facility processes diagrams or descriptions;
- Lists of ingredients of materials used in waste generating processes;
- Known or suspected byproducts of waste generating processes;
- MSDS;
- Testing data and/or other information ascertained from similar processes using the same ingredients/materials.

Alternatively, generators may opt to conduct laboratory analysis on the waste, post-generation. Though such analysis provides a definitive basis for classification, it can be quite costly to perform.

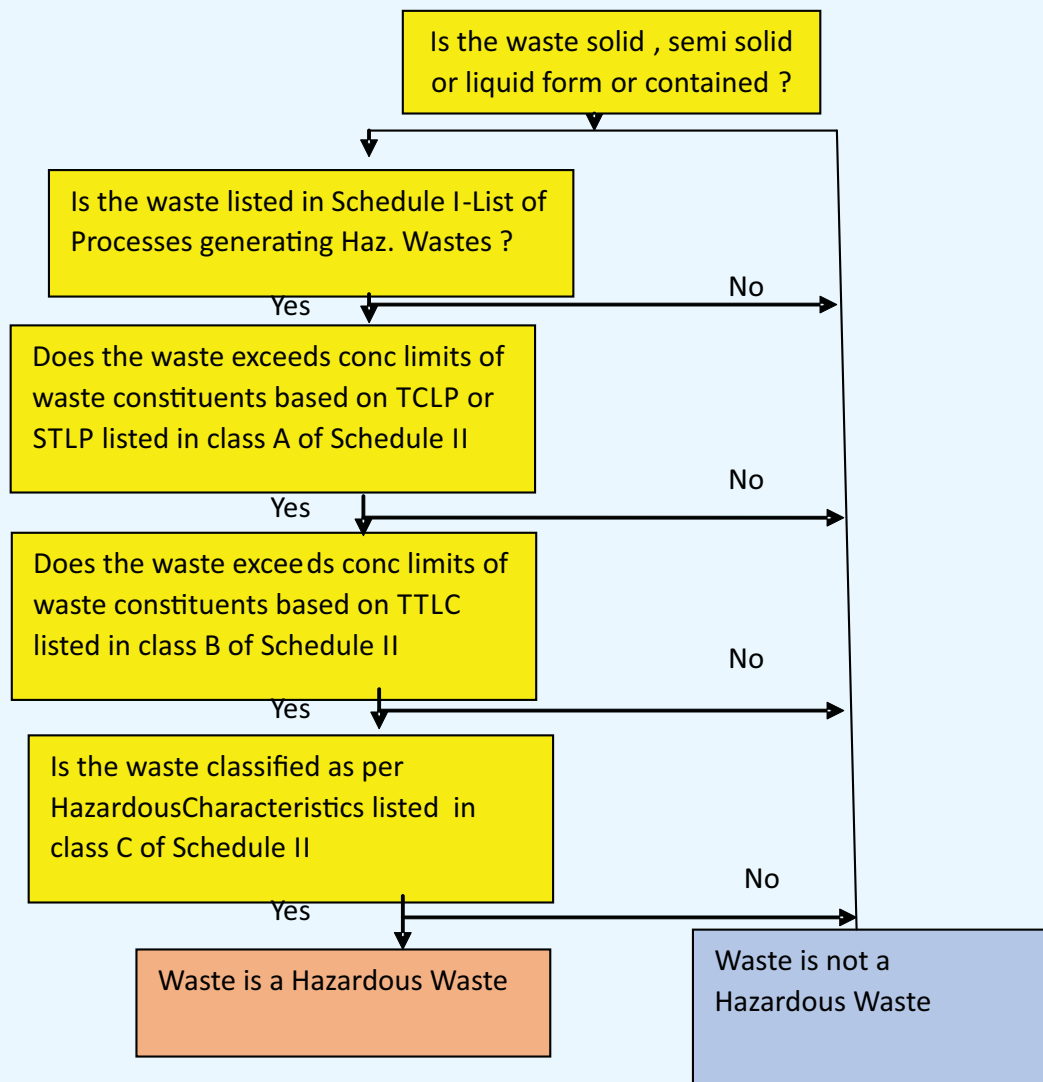


Figure 2.1: Flowchart for determination of hazardous waste as per Rules 2016

2.2 Responsibilities of Occupier

Certain responsibilities have been rested on the occupier of hazardous and other wastes generator for safe and environmentally sound management of hazardous wastes starting from pollution prevention to safe disposal. The occupier is required to follow the following steps:

- pollution prevention;
- waste minimization;
- 3 R concept (reuse, recycle and recovery);



- Utilization including co-processing of hazardous wastes in other industries as raw materials or as a fuel substitute;
- Efficient treatment and safe disposal;
- Hazardous waste & other wastes shall be sent or sold to an authorized actual user or disposed in an authorized disposal facility only;
- Shall transport wastes through an authorized or certified transporter to an authorized actual user or to an authorized disposal facility as per the provisions of these rules;
- Shall provide specific information to TSDf for treatment and disposal, as required for safe storage and disposal;
- Shall take all the steps to contain contaminants and prevent accident & limit their consequences on human beings and the environment;
- Shall provide persons working with appropriate training, equipment and the information necessary to ensure their safety;
- Shall make an application in Form 1 (Appendix E) to the SPCB for Grant of authorization for managing hazardous and other wastes along with copies of Consent to establish under Water and Air Acts. In case of renewal of authorization, a self-certified compliance report of effluent, emission standards and the conditions specified in earlier authorization of hazardous & other wastes;
- Shall make renewal application three months before the expiry of authorization;

2.3 Storage Requirements

The occupiers of facilities generating hazardous & other wastes may store for a period of not more than ninety (90) days and a maximum quantity of ten (10) tonnes. The State Pollution Control Board may extend the said period of ninety days in the following cases:

- a. Small generators (up to ten tonnes per annum) up to one hundred and eighty (180) days of their annual capacity;
- b. Actual users and disposal facility operators up to one hundred and eighty (180) days of their annual capacity;
- c. Occupiers who do not have access to any TSDf in the concerned State; or
- d. The waste which needs to be specifically stored for development of a process for its recycling, recovery, pre-processing, co-processing or utilization;
- e. In any case on justification grounds up to one hundred and eighty (180) days;



2.4 Labeling Requirements

The occupier must mark the hazardous waste containers with the labels as specified in Form 8 (Appendix E) of the Rules with fluorescent yellow colour background written in RED words as 'HAZARDOUS WASTES' and 'HANDLE WITH CARE' in Hindi, English and vernacular language. The word 'OTHER WASTES' to be written prominently in orange in Hindi, English and vernacular language.

Waste Category and characteristics as _____	Incompatible wastes and substances.....
Total Quantity.....	Date of Storage.....
Physical State of the waste (Solid/Semi-solid/liquid):	
<p>'HAZARDOUS WASTES' 'HANDLE WITH CARE' OR 'OTHER WASTES'</p>	
Sender's name and address	Receiver's name and address
Phone.....	Phone.....
E-mail.....	E-mail.....
Tel. and Fax. No.....	Tel. and Fax. No.....
Contact Person.....	Contact Person.....
In case of Emergency please Contact.....	

Figure – 2.4: Sample for Labeling of Containers of Hazardous and Other Wastes.

2.5 Hazardous Waste Accumulation/Storage Area

In a large establishment where a number of wastes are being generated, an area be designated as a storage area known as central hazardous waste accumulation area. This is an area where hazardous wastes are accumulated prior to being picked up for treatment, recycling or disposal. Requirements for these areas include:

- The accumulation area must be locked or protected from unauthorized entry. A fence around the area is not required if it is in an area that is



already restricted from unauthorized personnel.

- Containers must be labeled with the appropriate hazardous waste label.
- There must be appropriate signage identifying the area as hazardous waste storage, and a “No Smoking” signage.
- Weekly inspections must be conducted at these areas using the weekly inspection checklist.
- There must be sufficient aisle space to allow unobstructed movement of personnel, fire protection equipment, spill control equipment, and decontamination equipment to any area of the operation.



The following equipment must be easily accessible, in working condition, and regularly tested:

- Internal communications or alarm system capable of providing immediate emergency instruction to personnel.
- Telephone or hand-held two-way radio capable of contacting local and emergency responders.
- Portable fire extinguishers and fire control equipment, including special extinguishing equipment (foam, inert gas, or dry chemicals).
- Fire hydrants or other source of water (reservoir, storage tank, etc.) with adequate volume and pressure, foam producing equipment, automatic sprinklers, or water spray system.
- Spill control equipment.
- Secondary containment for liquid wastes.

2.6 Hazardous Waste Compatibility

Some types of chemicals (based on their chemical property /characteristic) when they come into contact with chemicals they are not compatible with can cause chemical reactions that could create a hazardous reaction. This could involve the production of toxic gas, accelerated corrosion, or an exothermic reaction (a chemical reaction that releases heat), which could result in an explosion and/or fire.

Even though hazardous waste is stored in containers,



there is a risk of mixing if there is a material spill/release due to lack of proper storage or if there is a natural disaster that can cause a release of chemicals.

It is therefore important to understand what types of chemicals are compatible to store together and which are not compatible, so as to avoid mixing of incompatible chemicals.

Below is a general guidance describing which types of chemicals/materials should not be mixed or stored nearby.

Keep the following materials segregated from each other:

- Acids and bases (for example lead acid batteries and caustic cleaners)
- Flammables or combustibles and oxidizers (for example paint thinner and bleach)
- Corrosives and flammables or combustibles (for example acid cleaners and oil)

When storing hazardous wastes, it is important that the waste is not placed in containers made of materials that could pose compatibility issues like those mentioned above. For example, do not place acids in metal drums because the acid will corrode the container and cause a leak.

The following chemical compatibility chart would help occupier to identify non-compatible chemicals in their wastes.

Table -- 12.6.1: Chemical Compatibility Chart

Group 1-A	Group 1-B
Alkaline Liquids	Acid Liquids
Potential consequences: Heat generation, violent reaction	
Group 2-A	Group 2-B
Aluminum	Any waste in Group 1-A or 1-B
Beryllium	
Calcium	
Magnesium	
Sodium	
Other reactive metals and metal hydrides	
Potential consequences: Fire or explosion generation of flammable hydrogen gas	
Group 3-A	Group 3-B
Alcohols	Any concentrated waste in Groups 1-A or 1-B
Water	Calcium
	Lithium

Metal hydrides
 Potassium
 SO₂Cl₂, SOCl₂,
 PCl₃,
 CH₃SiCl₃
 Other water-reactive wastes

Potential consequences: Fire, explosion, or heat generation; generation of flammable or toxic gases

Group 4-A	Group 4-B
Alcohols	Concentrated Group 1-A or 1-B wastes
Aldehydes	Group 2-A wastes
Halogenated hydrocarbons	
Nitrated hydrocarbons	
Unsaturated hydrocarbons	
Other reactive organic compounds and solvents	

Potential consequences: Fire, explosion, or violent reaction

Group 5-A	Group 5-B
Spent cyanide and sulfide solutions	Group 1-B wastes
Potential consequences: Generation of toxic hydrogen cyanide or hydrogen sulfide gas	
Group 6-A	Group 6-B
Chlorates	Acetic acid and other organic acids
Chlorine	Concentrated mineral acids
Chlorites	Group 2-A wastes
Chromic acid	Group 4-A wastes
Hypochlorites	Other flammable and combustible wastes
Nitrates	
Nitric acid, fuming	
Perchlorates	
Permanganates	
Peroxides	

Source: (From Boston Univ. Medical Center)

Note: When in doubt consult the Material's Safety Data Sheet (MSDS) to identify chemical properties and hazard warnings.

Good Practices for Hazardous Waste (HW) Handling & Storage:

- Maintain the containers in good condition and immediately replace leaking ones;
- Keep the HW containers closed at all times except when removing the waste;
- Never Avoid fill the lineto the top of any container containing liquid HW and allow at least 5 cm of air space near the top to control inside vapour pressure;
- Follow working procedures & instructions regarding the safe handling & emergency response;
- Use the designated personal protective equipment (PPE);

2.7 Container Management

The following are requirements for hazardous waste containers:

- Containers must be compatible with the waste in them.
- Containers must be kept closed except when waste is actually being added or removed.
- Containers must not be leaking, bulging, rusting, damaged, or dented.
- Store liquid waste containers on secondary containment pallets.
- For Large Quantity Generators Only: Containers holding ignitable or reactive wastes must be placed at least 15m (50ft) from the facility's property line and incompatible wastes must be separated by a berm or wall.

2.7.1 Management of Empty Container

The industrial establishments generate good quantity of raw material containers after their use. These containers may contain residual hazardous chemicals which may pose threat not only to the environment but also to human being. It is therefore important to manage these containers in environmentally safe manner.

An occupier must also know that what type of hazardous wastes can be imported or exported out of the country. The following flow chart will help the occupier to identify the wastes for import and export purpose as per Hazardous Waste Rules, 2016.

3. IMPORT AND EXPORT OF HAZARDOUS AND OTHER WASTES

Though hazardous waste is banned for import for disposal in the country, however, it is allowed for recycle, reuse, recovery and co-processing purpose. In order to regulate import and export of hazardous and other wastes, the Ministry of Environment, Forests and Climate Change has made provisions in the regulations under Chapter III sub-rules 11, 12, 13, 14 and 15 of Rules, 2016. The type of wastes to be imported and exported have been listed under Part A to D of Schedule III.

An occupier must also know that what type of hazardous wastes can be imported or exported out of the country. The following flow chart will help the occupier to identify the wastes for import and export purpose as per Hazardous Waste Rules, 2016.

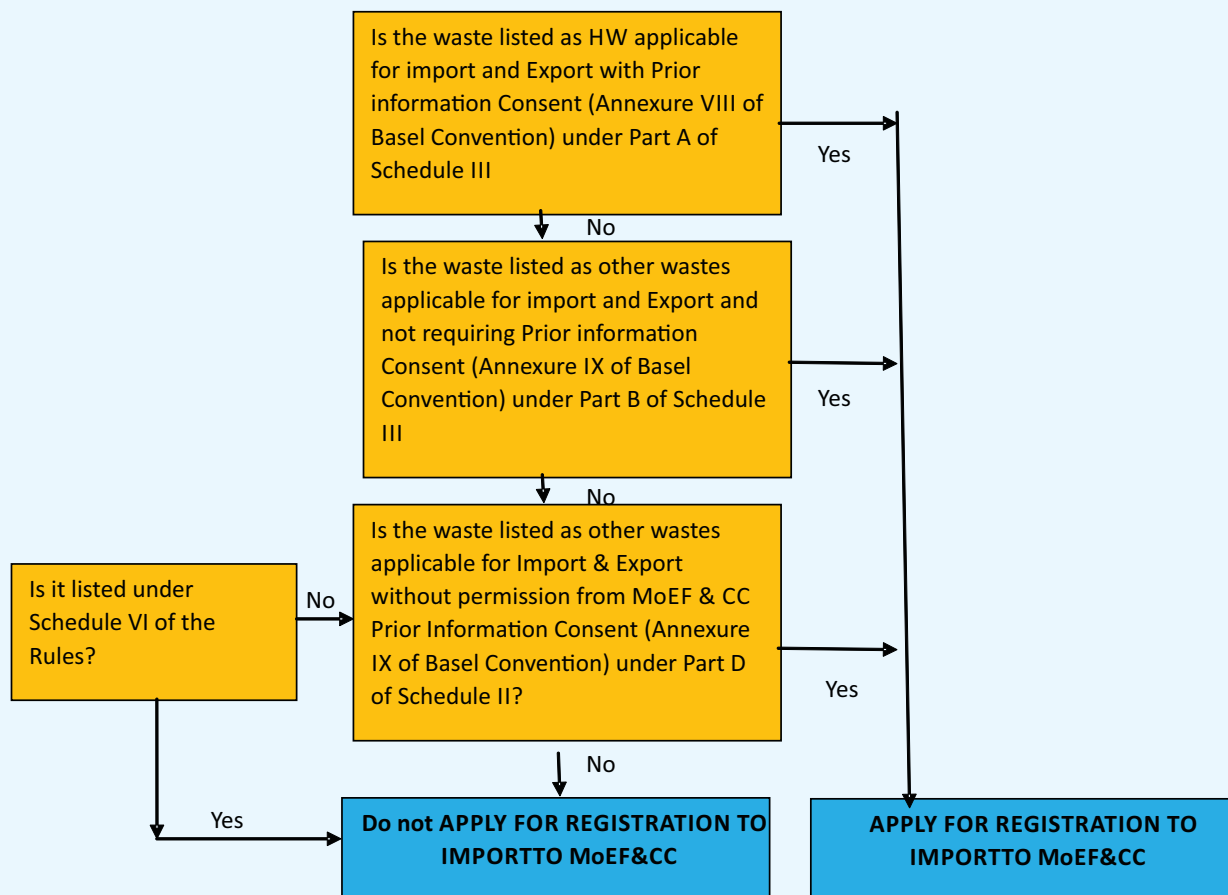


Figure 3.0: Flowchart for determination of Import & Export of Hazardous waste as per Rules, 2016

3.1 Responsibilities of Importer

An occupier (actual user only) intends to import or transit for transboundary movement of hazardous and other wastes as specified in Part A & Part B of Schedule III shall apply to the MOEF&&CC in Form 5 (Appendix E) of the Rules, 2016.

The occupier is not required to obtain permission to import other wastes listed in Part D of Schedule III from the MOEF&CC. However, the importer needs to submit required information as per Form 6 (Appendix E) to the Customs authorities, along with the following documents in addition to those listed in Schedule VIII, wherever applicable:

- a. The import license from DGFT, if applicable;
- b. The valid consents under Water Act, 1974 (25 of 1974), Air Act, 1981 (21 of 1981) and authorization under these rules and authorization under E-Waste (Management & Handling)

Rules, 2016 and as further amended, whichever is applicable;

- c. Importer who is a trader, who is importing on behalf of actual users, shall obtain one time authorization in Form 7 (Appendix E) and a copy of this authorization shall be appended to Form 6 (Appendix E).

In case of import of any used electrical and electronic assemblies or any components as listed under Schedule I of the E-Waste (Management & Handling) Rules, 2011/2016 and further amendments, the importer need to obtain extended producer responsibility (EPR) authorization as per procedure mentioned under E-Waste Rules.

The importer of the hazardous and other wastes is required to maintain records of wastes imported by him in Form 3 (Appendix E) which should be made available for inspection whenever required by the authorities.

The importer is required to file annual return in Form 4 (Appendix E) to the SPCB on or before the 30th day of June of the corresponding financial year.

The Ministry has prohibited hazardous and other wastes for import in the country as listed under Schedule VI of Hazardous & Other Wastes (Management and Transboundary Movement) Rules, 2016.

3.2 Procedure for Export of Hazardous & Other Wastes from India

Any occupier intends to export waste as specified in Part A & B of Schedule III and Schedule VI, is required to make an application to the MOEF&CC in Form 5 (Appendix E) along with insurance cover for the proposed transboundary movement of hazardous & other wastes. In addition, the importer shall also submit the prior informed consent (PIC) in writing from the importing country for the type of wastes specified in Part A of Schedule III and Schedule VI.

3.3 Illegal Traffic

The export and import of hazardous & other wastes from and into India shall be deemed illegal, if:

- i. It is without permission of the Central Government in accordance with these rules; or
- ii. The permission has been obtained through falsification, mis-representation or fraud; or
- iii. It does not conform to the shipping details provided in the movement documents; or
- iv. It results in deliberate disposal (i.e., dumping) of hazardous or other wastes in contravention of the Basel Convention and of general principles of international or domestic law.

In such cases of illegal import of wastes, the importer shall be required to re-export the waste in question at his cost within a period of ninety (90) days from the date of arrival into India under the supervision of concerned Port and Custom authorities.

4.0 RECORD KEEPING

The occupier or hazardous and other waste generators and TSD owner shall maintain the following records, in addition to the regulatory requirement:

- Records of weekly inspection of the central accumulation area.
- Manifest for sending waste offsite for disposal or recycling.
- A copy of each signed manifest for until the facility receives a signed copy from the designated facility which received the waste. The returned signed copy is then retained as a record.
- Occupiers are required to keep records of waste analysis, tests, and waste.
- Training

In addition to the record keeping requirements noted above, the large quantity generators (LQG), facilities and TSD must keep the following additional documentation on file for at least 3 years:

- Hazardous waste contingency plan, including a record of the time, date, and details of any incident that requires implementing the contingency plan.
- Written training plan.
- Annual Report submitted to the SPCB by June 30 of each financial year.

5. HAZARDOUS WASTE GENERATOR TRAINING REQUIREMENTS

Improper waste handling could result in exposing employees to hazardous wastes. In addition, improper disposal of hazardous waste could result in contamination of soil and water, and ultimately fines and enforcement from the regulatory agencies.

The best way to prevent generating unnecessary waste and to avoid problems relating to hazardous waste is to thoroughly train employees on how to perform their job duties safely and properly. This knowledge can lead to improved efficiency and reduced waste. Good training may also enable employees to identify ways to improve performance and processes.



It is not only a good idea to teach employees how to handle hazardous waste correctly and how to respond to emergencies, but also a need for managing wastes in environmentally safe manner in order to reduce liability costs.

5.1 Training Requirements for Small Quantity Generators (SQG)

SQGs must ensure that all employees are thoroughly familiar with proper waste handling and

emergency procedures, relevant to their responsibilities during normal facility operations and emergencies as part of their required on site job training. Records on former employees must be maintained for at least three years from the date the employee last worked at the store.

5.2 Training Requirements for Large Quantity Generators (LQG)

Many large establishments have their captive facilities for the management of their hazardous wastes in house. It is important for them to provide proper training to their employees, who are engaged in handling of such wastes, for environmentally safe management of hazardous wastes. LQGs must ensure that employees receive initial hazardous waste training within 6 months of receiving and/or changing a job assignment involving the management of hazardous waste.

Specifically, LQGs must ensure that personnel receive classroom or on-the-job training on handling, storage, and emergency response considerations of managing hazardous waste. At a minimum, the training program must be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems, including, where applicable:

- Using, inspecting, repairing, and replacing emergency and monitoring equipment;
- Communications or alarm systems;
- Response to fire or explosions;
- Response to groundwater contamination incidents;
- Shutdown of operations.

Annual refresher training is also required to make sure employees stay on top of the requirements.

Employees must not work in unsupervised positions until they have completed the training requirements of this section.

5.3 Training Plan

Facilities must maintain a training plan at the facility that includes the following information:

- The job title for each position at the facility related to hazardous waste management, and the name of the employee filling each job;
- A written description of the type and amount of both introductory and continuing training that will be given to each person filling a position listed above; and
- Records that document the training or job experience required above as has been given to, and completed by, facility personnel.

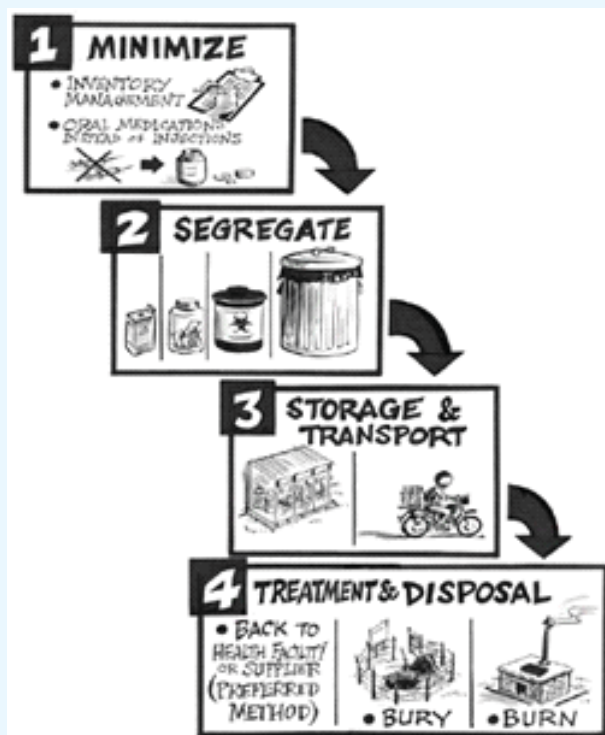
6. HAZARDOUS WASTE MANAGEMENT & HIERARCHY

Waste Management System involves basically a two-tier approach worldwide involving prevention and control of environmental pollution. The preventive approach aims at minimizing waste generation at source of generation by all possible means with the help of:

- a. Improvement in process technology & equipment which may completely eliminate waste streams;
- b. Improvement in plant operations; and
- c. Promoting use of materials through recovery/recycle/reuse of waste.

The hazardous waste management must also follow the same strategy. If not managed properly, it may have serious consequences, in view of its hazard potential.

The major obstacles in hazardous waste management, in our country, are more often institutional & behavioral rather than technical which are more related with the awareness and proper training. The hazardous wastes are seldom segregated from non-hazardous and/or recyclable wastes. Thus increasing the volume of hazardous waste which will increase the cost of treatment & disposal and depriving themselves of possible use of recoverables to minimize use of virgin raw materials.



Segregation is of utmost importance for Waste management in your company

In the The Hazardous Waste Management Hierarchy, waste minimization is at the top of the hierarchy and treatment & disposal of residual is at the bottom of the hierarchy.

The following steps may be taken by the generator of hazardous wastes for its handling in an effective manner:

Step 1: Systematically identify all hazardous & other wastes in your company as per the Schedules;

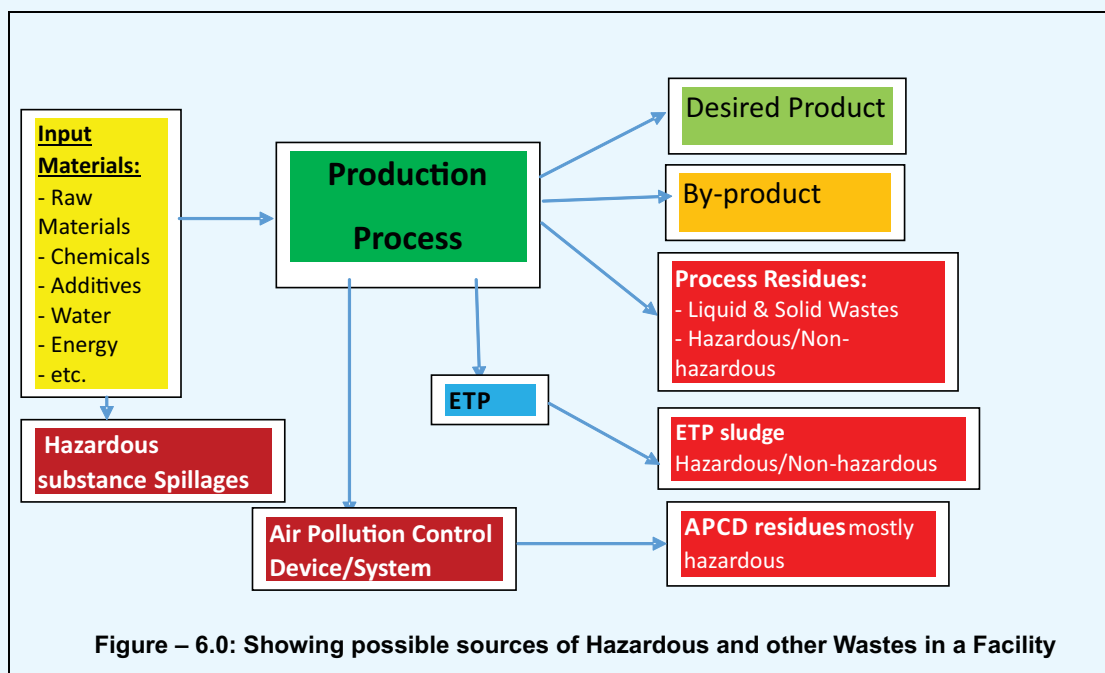
Step 2: Characterize and classify all Hws;

Step 3: Assign cost to all wastes in your company;

Step 4: Select and plan for waste management measures to:

- o Segregate waste at source of generation;
- o Have waste analyzed based on internal report;
- o Arrange for safe on-site collection, labeling & storage of wastes according to their compatibility;
- o Carry out preliminary/primary treatment on-site; and
- o Arrange for off-site treatment and disposal.

The hazardous wastes can be possibly generated at every stage of handling chemicals and producing the goods. The possible sources of the hazardous waste generation in a company is summarized in the following diagram.



The waste hierarchy consists of four major stages:

- Reduce – reduce the quantity of waste produced;
- Reuse – reuse items wherever possible;
- Recycle – recycle old materials into new products; and
- Residual – dispose of residual waste to landfill.

The principles of the waste hierarchy could be adopted as the basis for any waste management plan as per Figure 6.1.

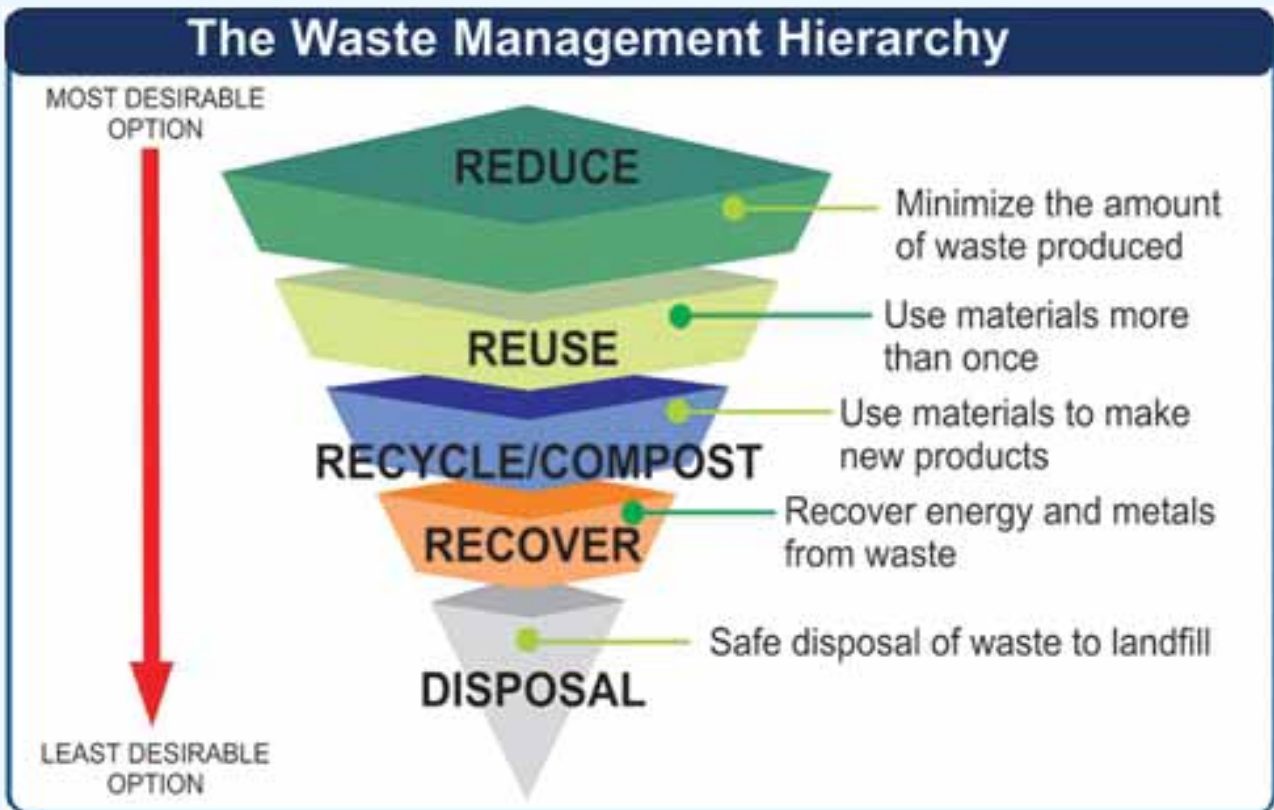


Figure – 6.1: Waste Management hierarchy

6.1 Waste Minimization/ Cleaner Production

As a generator of hazardous waste, the facilities must always try to minimize the amount of waste generated. Two common approaches to minimizing waste include: (1) waste avoidance or pollution prevention through cleaner production and (2) recovery, reuse & recycling.

The occupiers must have a program in place to reduce the volume and toxicity of waste generated to the degree the facility has determined to be economically practicable, currently available, and which minimizes the present and future threat to human health and the environment.

Cleaner Production – As per UNEP (1990), the Cleaner Production is defined as “The continuous application of an integrated environmental strategy to processes, products and services to increase efficiency & reduce risks to human and the environment.

Prevention means measures taken before a substance, material or product has become waste, which reduce

- a) the quantity of waste, also through the reuse of products or the extension of the life span of products;
- b) the adverse impacts of the generated waste on the environment and human health;
- c) the content of harmful substances in materials and products; e.g. by
 - Input substitution, reducing the quantity as well as the hazard level of the waste;
 - Increased efficiency in the use of raw materials, energy, water or land;
 - Process and product design;
 - Improved maintenance and operation of equipment

Recycling means any recovery operation (see below) by which waste materials are reprocessed into products, materials or substances, whether for the original or other purposes. It includes the reprocessing of organic material but does not include energy recovery and the reprocessing into materials that are to be used as fuels or for backfilling operations;

Other recovery, including Waste Incineration with generation of energy means any operation the principal result of which is waste serving a useful purpose by replacing other materials. Recycling of non-ferrous metallic wastes such as zinc dross, brass dross, used lead acid batteries, copper oxide mill scale and used lubricating oil are good examples which can be recovered in an environmentally sound manner and techno-economically feasible, as well.

In some of the industries, some by products are generated along with the main product which are wastes for the generating industry. However, these wastes can be used as a raw material, either as such or after pre-processing, in other industry. The utilization of hazardous and other wastes as a resource or after pre-processing either for co-processing or any other use, including within the plant premises is permitted as per Sub-rule No. 9, Chapter II of the Rules, 2016 after obtaining authorization from State Pollution Control Board (SPCB). The following chart will help generators to distinguish waste from by-products.

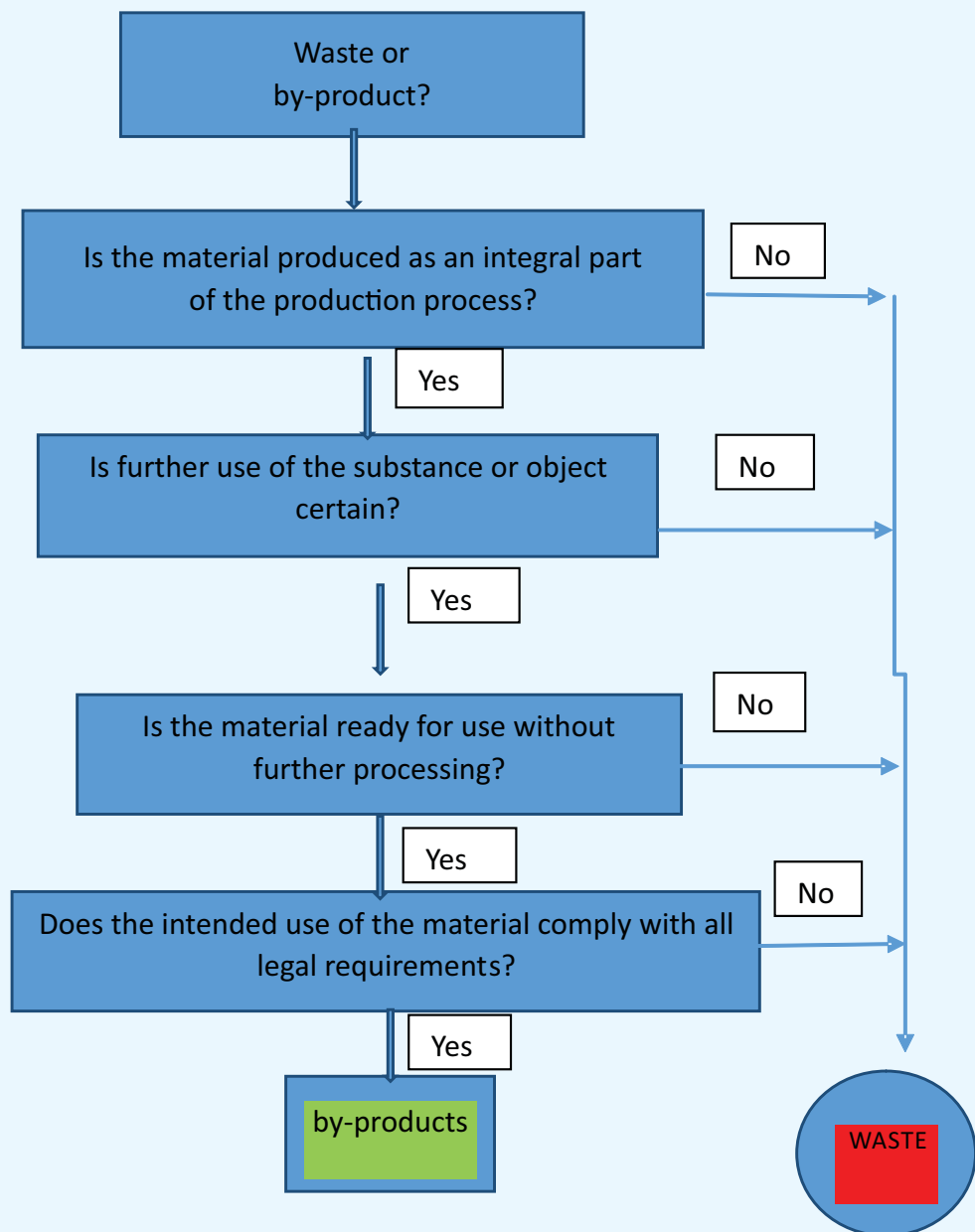


Figure – 6.1: Decision tree to distinguish Waste from By-product.

Source: EU Framework Directive 2008/98/EC

6.2 Co-processing of Hazardous Wastes

Cement industry is the best suited for not only hazardous waste destruction due to high temperature (1400oC) and residence time (4-5 sec.) in an oxygen rich atmosphere but also to utilize large quantity of hazardous wastes. Cement industry also utilizes large quantity of virgin coal as raw material for their energy requirement, in addition to other raw materials. Cement industry offers

the best conditions for the utilization of hazardous and other wastes in environmentally safe manner. Internationally, the use of cement industry for managing hazardous wastes has been a practice since long. However, it has been established in India after a series of field trials by CPCB.

HW utilization

International Practice:

250 Cement works in Europe utilise about 3 million tons of HW per year.

National Practice:

In 2009, ACC co-processed 77,751 tonnes of waste substituting 61,965 tonnes of coal.

Waste recovery and coal replacement in the cement industry has only been practiced for a relatively short time in the country. As such, the thermal substitution rate (TSR) is still below one per cent. ACC, Ambuja, Lafarge, Shree Cement and UltraTech are involved in co-processing activities with hazardous waste. India's top two cement producers, ACC and UltraTech, has reached a TSR of 0.59 per cent and 0.47 per cent, respectively as of February 2011 (Karunakaran and Ghosh, 2011).

Many cement companies have no experience with co-processing of alternative fuels, however, very few have utilized Municipal Solid Waste (MSW) in the form of Refuse-Derived Fuel (RDF). The substitution of raw materials and clinker with industrial inorganic waste materials like fly ash from coal-fired thermal power plants and blast furnace slag (BFS) from the production of pig iron is widely practiced. Indian cement standards allow up to 35 per cent clinker substitution by fly ash or 70 per cent by BFS.



6.2.1 Benefits of Co-processing in Cement Industry

There are a number of benefits for co-processing hazardous and other wastes in cement industry. Some of the benefits are highlighted below:

- High temperatures (1400OC) and residence time of 4 – 5 seconds in an oxygen-rich atmosphere ensure the destruction of organic compounds.
- Any acid gases formed during combustion are neutralized by the alkaline raw material and are incorporated into the cement clinker.
- Interaction of the flue gases and the raw material present in the kiln ensures that

About 25 cement plants have started co-processing in India. CPCB has tested and permitted the following main categories of hazardous wastes:

- paint sludge from the automobile sector
- petroleum refining sludge
- tar from the production of toluene di iso-cyanate (TDI-tar)
- effluent treatment plant sludge (ETP).
- Plastic wastes and tyre chips

the non – combustible part of the residue is held back in the process and is incorporated into the clinker in a practically irreversible manner.

- No waste is generated that requires subsequent processing.

This will also have environmental and other benefits as below:

- Avoid land disposal or incineration of wastes
- Avoid future liability for wastes and associated problems
- Avoid investment on developing TSDF
- Gain Environmentally responsible image
- Be seen as a good steward of resources
- Reduction in Green House gases (GHG) emission & related benefit of carbon trading
- Conversion of waste into energy / as a raw mix component
- Reduced burden on TSDF
- Conservation of fossil fuel & raw material resources
- Immobilization of toxic and heavy material
- Reduction in energy / cement production costs

6.2.2 Material and Energy Recovery

Whether hazardous waste can be sent for recovery, treatment or disposal options depends on the chemical and physical properties of the waste. Recovery options may include various types of material and/or energy recovery. Material recovery makes use of the material value embedded in the waste whereas energy recovery utilizes its calorific value. When choosing between material and energy recovery for a given waste type, priority should be given to the option that has less negative environmental impacts.

Material recovery: With regard to the application of the recycled/recovered product, three types of material recovery can be possible:

- On-site recycling of residues and re-using them for the same application as where they were generated (e.g., re-distillation of spent solvents, re-refining of spent lube oil, regeneration of spent catalysts, of activated carbon, resins, spent acids & bases etc.)
- Processing of residues in order to use them for off-site application in a different process as a substitute for raw materials or additives (e.g., using incineration slag for road- or other construction works, using fly ash as alternative raw material for cement making or for filling cavities in exhausted mines, etc.)
- Recovery of valuable product and substitution of virgin raw materials by raw materials

recovered from waste (e.g., recovering copper from cable residues and re-melting of the copper or recovery of lead from used batteries). Material recovery is generally economically viable when the concentration of the material to be recovered is high and concentrations of accompanying contaminants are low. The material recovery is governed by other factors such as raw materials prices.

Energy recovery

The principal purpose of energy recovery is to make use of the energy value embedded in the waste. Liquid, slurry and solid wastes with sufficient calorific value such as spent lube oil, solvents, tank bottom sludge, solid and semi-solid grease, wax, organic distillation residues, waste wood and saw dust, waste paper & plastic packaging material, etc. can be used as a substitute- or alternative fuel for all industrial processes that require thermal energy input.

The following type of wastes which has good calorific value can be utilized as alternative fuel in cement industries:

Table – 6.2.1: Showing Waste types with Calorific Values (CV)

S. No.	Type of Waste	Calorific Value (kcal./kg)
1	RDF from MSW	2,800–3,800
2	Used Tyres	6,700–7,700
3	Hazardous Waste	4,000–9,500
4	Industrial Plastic Waste	4,070–6,620
5	Biomass	2,500–3,800
6	Slaughter house Waste	700–1,400
7	Poultry Litter	2,700–3,800
8	Dried Sewage Sludge	1,700–1,900

Source: Holtech & CPCB

A number of hazardous and other wastes such as spent solvent, distillation residues from organic chemical industries and oily sludge from oil refinery, petrochemical & paint industry are being used not only as an alternative raw materials but also as source of energy. Incineration of high calorific value hazardous wastes in cement kilns is one of the safe alternatives for disposal of wastes. Many effluent treatment plant sludges are also used as raw material in cement industries. The wastes having high Sulphur contents may deteriorate the quality of cement. Hence, it need to be monitored and regulated. CPCB has permitted some of the wastes after conducting field trials to be used in cement kilns. The following type of wastes have potential for utilization in cement and/or other industries.

Table – 6.2.2: Waste Recycling/Reuse Opportunities in India

S. No.	Type of Wastes Generated	Quantity of Waste	Areas of Utilization Recycle/Reuse
1	Fly ash from thermal power plant	200 Million Tons Per Annum (MTA) (600 MTA by 2030)	Fly ash pozzolona cement, increase of ash dyke height, road construction, brick manufacturing
2	Blast furnace slag from iron and steel plant	10 MTA	Slag cement
3	Steel melting shop slag (SMS) from steel plant	-	Slag cement after removal of iron
4	Phospho gypsum	8 MTA	Cement making
5	Distillery spent wash	About 100 distillery in operation (capacity 60-600 KLD)	Concentrated spent wash for power generation
6	Spent pot lining (aluminum industry waste)	-	Carbon portion of SPL can be used as fuel in cement kiln
7	waste solvent, high COD waste)	200,000 Tonnes/annum (TPA)	Can be used as partial fuel in cement kiln Pharmaceutical / pesticide industry (distillation residue, process residue, mixed waste solvent, high COD waste)
8	Municipal solid waste	1,30,000 Tonnes /day (TPD)	RDF from MSW can be used as fuel in cement kiln / boiler
9	Plastic waste	15,500 Tonnes /day (TPD)	Can be recycled / used as a fuel in cement kiln
10	Used tyres	83,000 Tonnes/annum (TPA)	Shredded tyres can be used as fuel in cement kiln

Source: Dr. B. Sengupta, Ex Member Secretary, CPCB

Apart from these, there are a number of waste streams which has potential for waste utilization either through recovery and/or manufacturing of valuable products. The following table highlights types of wastes which has potential for utilization other than co-processing.

Table – 6.2.3: Showing Waste Utilization options other than Co-processing

S. No.	Type of Hazardous Wastes for Utilization	Product to be manufactured
1	Hydro Fluoro Silicic acid waste	Sodium Silica Fluoride
2	Waste Pickling liquid	Ferrous Sulphate
3	Spent Chromic acid solution	Chromate & Dichromate Salts
4	Spent Anode Butt	Carbon Electrode, carbon source in steel smelting
5	Ethylene Glycol Residue	As a fuel in captive boiler
6	Spent acid containing Molybdenum Compound	Ammonium Molybdate
7	Anode mud	Manganese Sulphate
8	ETP Sludge	Cardboard/Mill Board/ Egg trays
9	Spent Pickling Acid	As a coagulant aid in ETP
10	Gas cleaning plant sludge	Manganese Oxide
11	Carbon Slurry	Carbon Black

6.2.3 Best Practices of HW utilization other than Co-processing:

CPCB had granted permission to some of the units to utilize their hazardous wastes within their premises as per Hazardous Wastes (Management, Handling & Transboundary Movement) Rules, 2008. Some of the examples are given in the following table.

Table – 6.2.4: Best Practices of Hazardous Wastes Utilization – Some Examples

S. No.	Name of the Unit	HW permitted to be Utilized	Product to be Manufactured
1	M/s. Sumak Pigments & Molybdate Pvt. Ltd., Musalgaon, Dist. Nashik (Mah.)	Spent acid containing Molybdenum compound	Ammonium & Sodium Molybdate
2	M/s. Universal Chemicals, Kota (Raj.)	High boiler residue	Toluene
3	M/s. Grishma Metal Technology, Bilawali, Dist. Thane (Mah.)	Spent acid containing Molybdenum compound	Ammonium Molybdate
4	M/s. Chem Sale Organization, Hapur (U.P.)	Spent Chromic acid	Chromate & dichromate salt
5	M/s. Continental Carbon (I) Pvt. Ltd., Ghaziabad (U.P.)	Carbon slurry	Carbon black
6	M/s. Uflex Ltd., Bhind (M.P.)	Ethylene Glycol residue	Supplementary fuel in captive boiler
7	M/s. Tata Chemical Ltd., Medinipur (W.B.)	I) ETP sludge from ETP plant; II) Sulphur sludge from sulphuric acid plant	I) ETP sludge by mixing with gypsum to be used in cement plant; II) Sulphur sludge as a filler in SSP plant.

Source: CPCB Website

7. DISPOSAL

Disposal is any operation which is not recovery, even where the operation has the reclamation of substances or energy as a secondary consequence. Further, it is the process, where waste is not subject to further closed-loop recycling management. Land filling and incineration without energy recovery are typical examples for disposal operations. The hazardous waste management strategy should be as below.

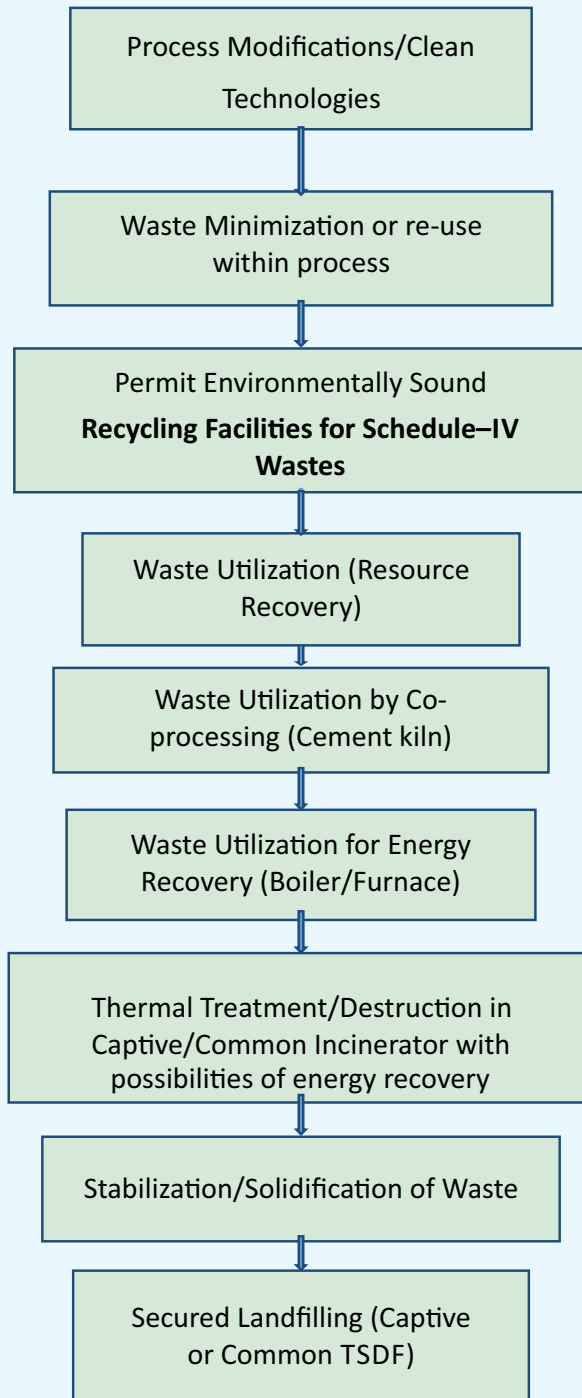


Figure – 7.0: Proposed Hazardous Waste Management Strategy

The last option for the hazardous waste management is to treat and /or dispose of the waste in environmentally safe manner. Depending upon the type of waste, its characteristics, land disposal or thermal destruction through incineration can be adopted. Such facilities can be either captive or common. The design & operational norms of such facilities should strictly follow the guidelines published by CPCB.

7.1 Quality Management System

Quality management is an important aspect in hazardous waste management system which should start right from the procurement of raw materials to process optimization, waste minimization, 3 R till final treatment and disposal



Figure – 7.1: Showing Quality Management Strategy in Hazardous Waste Management

The occupier must ensure that the system developed is in accordance with the regulatory requirements and are being followed strictly within the organization to avoid any legal repercussions. The following check list will help the occupier in managing their wastes.

Table – 7.1: Check list for Hazardous Waste Management

S.No.	Aspects	Yes	Partly	No
1	All HW is company identified			
2	All HW segregated from non-hazardous ones			
3	All HW classified as per Schedule I, II and/or III and quantified			
4	Have you identified the sources of HW and characterized?			
5	You know the composition of all HW produced in your company			
6	You have compiled all the relevant data related to HW			
7	You meet all the regulatory requirements on HW including authorization			
8	You have identified the HW service provider and signed the agreement			
9	You have sufficient space to store your HW as per the regulatory requirements			
10	You have collected & stored your HW in environmentally sound manner			
11	You have marked and labeled your HW as per HW Label			

7.2 Setting up of Common Hazardous Waste Treatment, Storage and Disposal Facilities (CHWTSDF)

Common facilities are envisaged to help small and medium enterprises (SMEs) to dispose off their hazardous waste (who cannot afford to have their captive facilities), in environmentally safe manner. Common facilities have been planned on the polluter-pays principle. As per the latest CPCB, there are 29 common secured landfill facilities (SLFs) with a total disposal capacity of about 34 Million Tonne (MT) and 14 common incinerators in 7 states with a total capacity of about 0.45 Million Tonne per Annum (MTA), in order to take care of hazardous wastes generated from various industries. The following diagram shows the pathway of hazardous waste movement from the source of generation to the final disposal.



Figure – 7.2.1: Showing pathway of hazardous waste movement

7.2.1 Components of CHWTSDF

An integrated waste management facility has all the components right from the collection, transportation, centralized storage, treatment (physical, chemical & thermal) and landfill disposal.

An integrated CHWTSDF may have the following components:

- Laboratory
- Storage area
- Transportation mechanism
- Treatment &
- Disposal
- Weigh Bridge
- Container Unloading & storage (Solids)
- Tanker unloading & storage (Liq.)
- Laboratory for testing;
- Waste Recovery(Solvents) (Optional);
- Incineration;
- Solidification/stabilization;
- Secured Landfill;
- ETP for leachate treatment; and
- Emergency equipment

Other facilities at site include:

- Storm water drainage channel
- Approach roads/ramp
- Leachate treatment system
- Ground water monitoring wells
- Closure system
- Fence and gate
- Approach & internal roads
- Waste inspection facility to monitor wastes received
- Weigh bridge, fire protection equipment, etc.
- Earth moving Equipment
- Lighting arrangements
- Safety provisions and health inspection for workers
- Water & Electricity supply

Need for Development of TSDF

- SMEs cannot afford hazardous waste management on their own
- Smaller facilities are costlier & difficult to maintain QA/QC
- Difficult to regulate & monitor
- Problem in identification of land

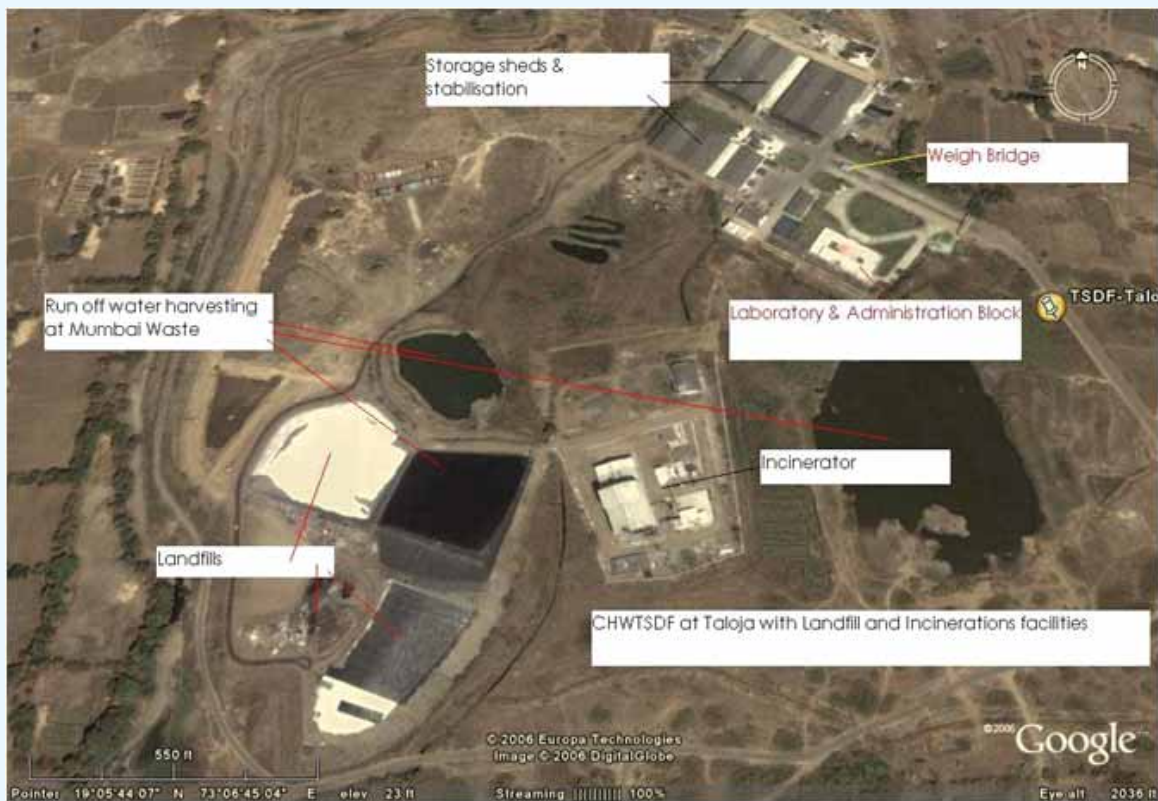


Figure – 7.2.2: An Aerial view of CHWTSDF at Mumbai

7.2.2 Waste Collection and Transportation to CHWTSDF

- Encourage separation of recyclable and incompatible wastes at the point of generation, so that the collection points and receiving stations do not become sorting points;
- Use compatible bags, tanks and containers specially designed and manufactured for storage and transportation of Hazardous Waste (HW),
- Follow applicable rules, guidelines and standards for packaging, labeling, and transport of hazardous wastes;
- Adequately label all transport tanks and containers to identify the contents, hazards, and actions required in various emergency situations,
- Maintain a regular collection schedule with sufficient frequency to avoid accumulation of HW at the source of generation;
- Use appropriate vehicles with emergency preparedness for transportation



7.2.3 Waste Receipt, Unloading and Storage

- Employ Sufficient personnel with the requisite qualifications and specific job training;
- Visually observe, weigh, and record incoming waste loads;
- Carry out the fingerprint analysis of wastes as per the CPCB Protocol to determine the waste suitability for TSDF and decide disposal option;
- Reject or re-process the incompatible wastes process and the incompatible wastes
- Store the wastes as per the compatibility in safe, secured and designated area equipped with safety and emergency preparedness measures;
- Collect runoff and leachate from areas used for waste storage, and treat runoff / leachate to meet applicable environmental standards;
- Minimize the storage of flammable liquids on site (e.g. fuel, flammable wastes)



7.2.4 Operation of CHWTSDF

7.2.4.1 Waste Pre-treatment:

- Employ various physico-chemical treatment such as sludge chemical treatment, sludge dewatering, blending, solidification/stabilization, solvent/organic recovery for volume dewatering, reduction/immobilization/minimization of leachate generation/recycle;
- Design and operate these facilities in accordance with applicable rules and guidelines
- Test the leachability of pretreated waste for various toxic compounds as per CPCB/USEPA guidelines prior to disposal in SLF



7.2.4.2 Incineration:

- Design and operate incinerators in accordance with CPCB guidelines (DRE > 99.9999);
- Accept the wastes with characteristics that conform to the feed requirement;
- Install an automatic system to prevent feeding of



hazardous waste to the incinerator when operating conditions deviate from the design/acceptable range (Temp., residence time (RT), Turbulence)

- Continuously monitor incinerator parameters including waste feed rate, total hydrocarbons, temperature (measured at the end of the residence zone), and CO and oxygen (measured at the stack);
- Reduce the generation and emission of Air Pollution Control Devices (APCD), by ensuring rapid cooling of flue gas as well as good turbulence of the combustion gas, high temperature, adequate oxygen content, and adequate residence time.
- Treat combustion gases to remove metals and acid gases (e.g., by wet scrubbers);
- Control fugitive emissions from the combustion zone (e.g., by sealing the combustion zone or maintaining the combustion zone pressure below atmospheric pressure)

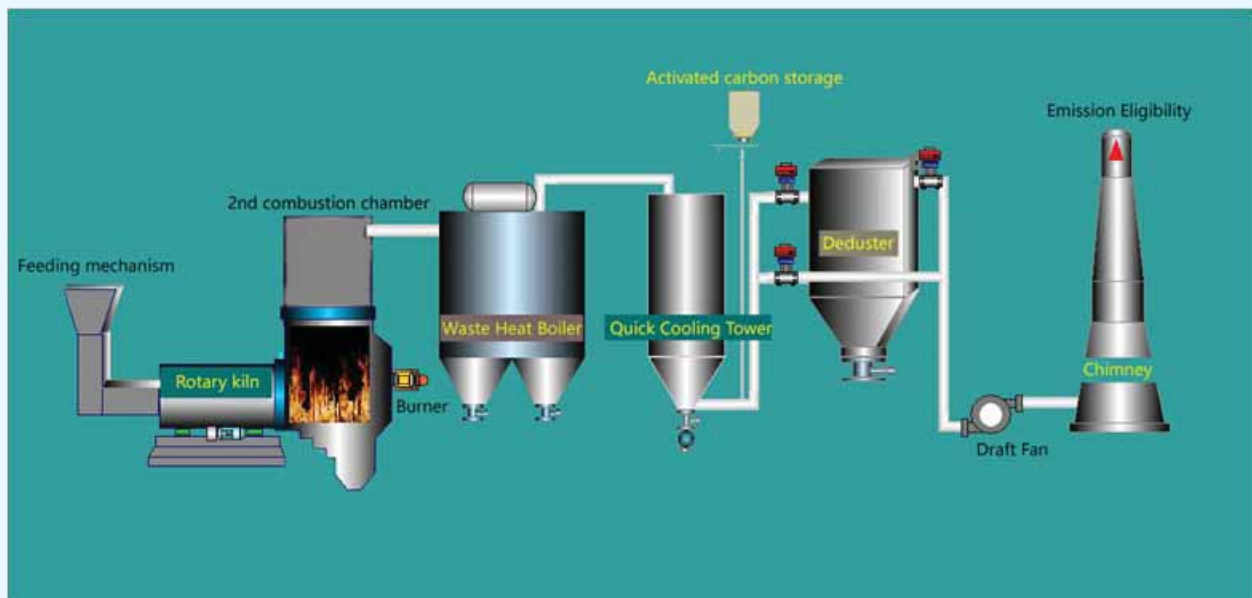


Figure – 7.2.3: Incineration Flow Diagram

7.2.4.3 Secured Landfill:

- Design, develop and operate the landfill in accordance with CPCB Guidelines
- During construction, inspect the liners and other layers for uniformity, damage, and imperfections. Take corrective action in case of damage.
- Use only dewatered and stabilized/solidified



wastes for disposal in these cells;

- Do not operate the SLF during monsoon season. Make arrangements for temporary storage of landfillable wastes during monsoon.
- Inspect the landfill regularly (weekly during operation and quarterly after closure) to detect evidence of any deterioration, malfunctions, or improper operation of run-on and run-off control systems, such as erosion of the final cover; proper functioning of leachate off control systems.
- Monitor the Groundwater in upstream and downstream areas of SLF.

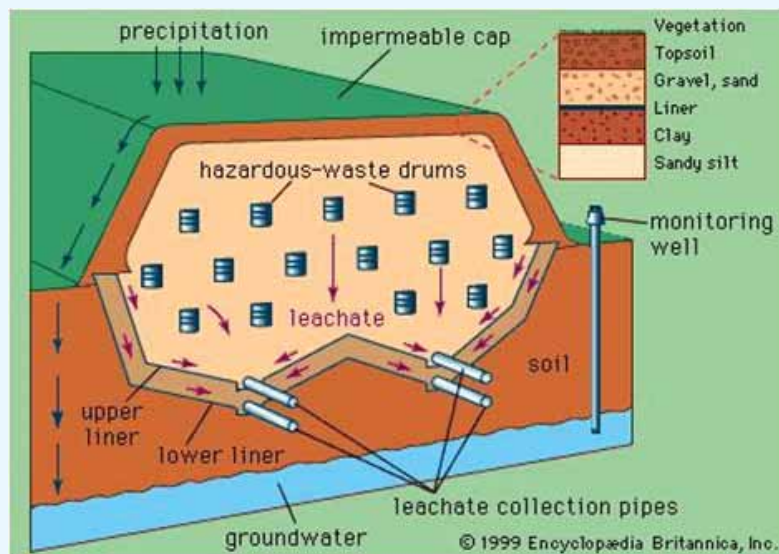


Figure – 7.2.4: Showing schematic diagram of Secured Landfill Facility

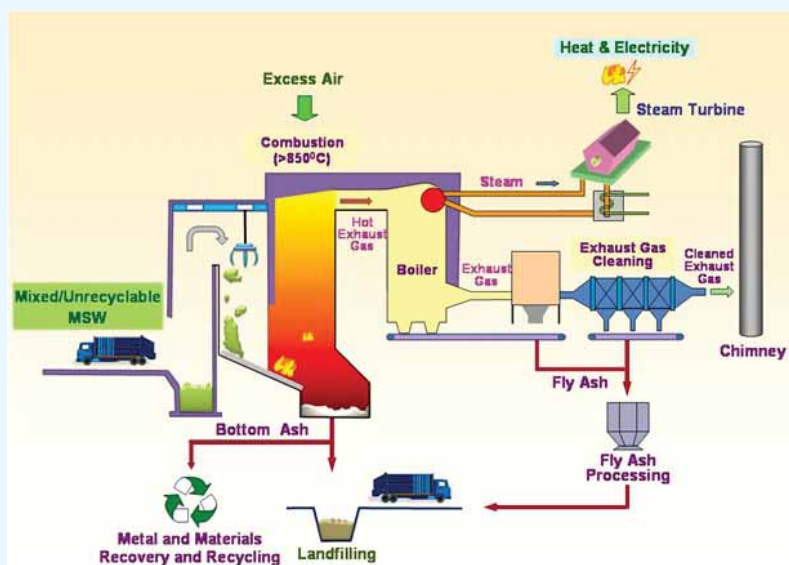


Figure – 7.2.5: Schematic Diagram of Common Treatment and Disposal Facility

8.0 HAZARDOUS WASTE EMERGENCY/CONTINGENCY PLAN

Normally the large facilities have their well established Emergency Management Systems in place. However, it is the responsibility of the occupiers and operators of CHWTSDF to make all the employees aware about the emergency procedures and prepare themselves in case of any emergency.

An emergency/contingency plan establishes the procedures that must be taken to minimize hazards to human health and the environment caused by explosions, fires, or unplanned sudden or non-sudden releases of hazardous waste or hazardous waste constituents to the air, soil, or surface water. The plan must be in writing, and it must identify who will be in charge of implementation in the event of an emergency.

The plan's provisions must be carried out immediately whenever there is a fire, explosion, or release of hazardous waste or hazardous waste constituents that could threaten human health or the environment. To prevent, mitigate, and abate emergencies, the following procedures, plans and equipment must be provided.

8.1 General Requirements

All operations must minimize the possibility of a fire, explosion or any unplanned release of hazardous waste or hazardous waste constituents to air, soil, or surface water that could threaten human health or the environment.

At all times there must be at least one employee either on the premises or on call with the responsibility for coordinating all emergency response measures. This employee may be the Environmental Officer or Emergency Coordinator.

All communications and alarm systems, fire protection equipment, spill control equipment and decontamination equipment, where required, must be tested and maintained as necessary to ensure its proper operation in time of emergency.

All hazardous waste handling personnel must have immediate access to an internal alarm or emergency communications equipment.

The occupier must maintain aisle space to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of operation in an emergency.

8.2 Use of Contingency Plan

In the event of an emergency, the contingency plan is implemented by:

- Calling the Fire Department;

- Containing and cleaning up small spills and releases, if possible;
- Contacting a private contractor to contain and cleanup large spills and releases;
- Informing Head of the organization about the incident

8.3 Emergency Communications

If only one employee is on the premises while the facility is operating, he/she must have immediate access to emergency communications equipment, such as a telephone / mobile or a hand-held two-way radio, capable of summoning external emergency assistance.

The following information must be posted next to the telephone (or other emergency communication device):

- The name and telephone number of the emergency coordinator;
- The location of fire extinguishers and spill control material, and fire alarm; and
- The telephone number of the fire department, unless the facility has a direct alarm.

8.4 Emergency Response Equipment

The facility must have the following emergency response equipment on-site and easily accessible to all concerned:

- Internal and external communication equipment;
- Fire control equipment;
- Water supply with adequate volume and pressure for fire suppression;
- Spill control equipment;
- Decontamination equipment;
- Personal protective equipment (PPE).

IMPORTANT DEFINITIONS

Actual User: An occupier who procures and processes hazardous and other waste for reuse, recycling, recovery, pre-processing, utilization including co-processing;

Authorization: Permission for generation, handling, collection, reception, treatment, transport, storage, reuse, recycling, recovery, pre-processing, utilization including co-processing and disposal of hazardous wastes granted under sub-rule (2) of rule 6;

Basel Convention: The United Nations Environment Programme Convention on the Control of Transboundary Movement of Hazardous Wastes and their Disposal;

Captive Facility: "Captive treatment, storage and disposal facility" - a facility developed within the premises of an occupier for treatment, storage and disposal of wastes generated during manufacture, processing, treatment, package, storage, transportation, use, collection, destruction, conversion, offering for sale, transfer or the like of hazardous and other wastes;

Co-processing: The use of waste materials in manufacturing processes for the purpose of energy or resource recovery or both and resultant reduction in the use of conventional fuels or raw materials or both through substitution;

Disposal: Any operation which does not lead to reuse, recycling, recovery, utilization including co-processing and includes physico-chemical treatment, biological treatment, incineration and disposal in secured landfill;

Export: "Export", with its grammatical variations and cognate expressions, means taking out of India to a place outside India;

Exporter: Any person or occupier under the jurisdiction of the exporting country who exports hazardous or other wastes, including the country which exports hazardous or other waste;

Environmentally Sound Management: "Environmentally sound management of hazardous and other wastes" means taking all steps required to ensure that the hazardous and other wastes are managed in a manner which shall protect health and the environment against the adverse effects which may result from such waste;

Facility: Any establishment wherein the processes incidental to the generation, handling, collection, reception, treatment, storage, reuse, recycling, recovery, pre-processing, co-processing, utilization and disposal of hazardous and, or, other wastes are carried out;

Hazardous Waste: Any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other wastes or substances, and shall include -

- (i) waste specified under column (3) of Schedule I;
- (ii) waste having equal to or more than the concentration limits specified for the constituents in class A and class B of Schedule II or any of the characteristics as specified in class C of Schedule II; and
- (iii) wastes specified in Part A of Schedule III in respect of import or export of such wastes or the wastes not specified in Part A but exhibit hazardous characteristics specified in Part C of Schedule III;

Import: With its grammatical variations and cognate expressions, means bringing into India from a place outside India;

Importer: Any person or occupier who imports hazardous or other waste;

Manifest: Transporting document prepared and signed by the sender authorized in accordance with the provisions of these rules;

Occupier: In relation to any factory or premises, means a person who has, control over the affairs of the factory or the premises and includes in relation to any hazardous and other wastes, the person in possession of the hazardous or other waste;

Operator of disposal facility: A person who owns or operates a facility for collection, reception, treatment, storage and disposal of hazardous and other wastes;

Other Wastes: As specified in Part B and Part D of Schedule III for import or export and includes all such waste generated indigenously within the country;

Pre-processing: The treatment of waste to make it suitable for co-processing or recycling or for any further processing;

Recycling: Reclamation and processing of hazardous or other wastes in an environmentally sound manner for the originally intended purpose or for other purposes;

Reuse: Use of hazardous or other waste for the purpose of its original use or other use;

Recovery: Any operation or activity wherein specific materials are recovered;

Storage: Storing any hazardous or other waste for a temporary period, at the end of which such waste is processed or disposed of;

Transboundary Movement: Any movement of hazardous or other wastes from an area under the jurisdiction of one country to or through an area under the jurisdiction of another country or to or through an area not under the jurisdiction of any country, provided that at least two countries are involved in the movement;

Treatment: A method, technique or process, designed to modify the physical, chemical or biological characteristics or composition of any hazardous or other waste so as to reduce its potential to cause harm;

TSDf: Common treatment, storage and disposal facility” means a common facility identified and established individually or jointly or severally by the State Government, occupier, operator of a facility or any association of occupiers that shall be used as common facility by multiple occupiers or actual users for treatment, storage and disposal of the hazardous and other wastes;

Used Oil: Any oil-

- (i) derived from crude oil or mixtures containing synthetic oil including spent oil, used engine oil, gear oil, hydraulic oil, turbine oil, compressor oil, industrial gear oil, heat transfer oil, transformer oil and their tank bottom sludges; and
- (ii) suitable for reprocessing, if it meets the specification laid down in Part A of Schedule V but does not include waste oil;

Utilization: Use of hazardous or other waste as a resource;

Waste: Means materials that are not products or by-products, for which the generator has no further use for the purposes of production, transformation or consumption.

Explanation.- for the purposes of this clause,

- (i) waste includes the materials that may be generated during, the extraction of raw materials, the processing of raw materials into intermediates and final products, the consumption of final products, and through other human activities and excludes residuals recycled or reused at the place of generation; and
- (ii) by-product means a material that is not intended to be produced but gets produced in the production process of intended product and is used as such;

Waste Oil: Any oil which includes spills of crude oil, emulsions, tank bottom sludge and slop oil generated from petroleum refineries, installations or ships and can be used as fuel in furnaces for energy recovery, if it meets the specifications laid down in Part-B of Schedule V either as such or after reprocessing.

List of Hazardous Characteristics as per Rules, 2016**List of Hazardous Characteristics****(As per Part C of Rules, 2016)****Code Characteristic****H 1 Explosive**

An explosive substance or waste is a solid or liquid substance or waste (or mixture of substances or wastes) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surrounding.

H 3 Flammable liquids

The word “flammable” has the same meaning as “inflammable”. Flammable liquids are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc. but not including substances or wastes otherwise classified on account of their dangerous characteristics) which give off a flammable vapour at temperatures of not more than 60.5°C, closed-cup test, or not more than 65.6°C, open-cup test. (Since the results of open-cups tests and of closed-cup tests are not strictly comparable and even individual results by the same test are often variable, regulations varying from the above figures to make allowance for such differences would be within the spirit of this definition).

H 4.1 Flammable solids

Solids, or waste solids, other than those classed as explosives, which under conditions encountered in transport are readily combustible, or may cause or contribute to fire through friction.

H 4.2 Substances or wastes liable to spontaneous combustion

Substances or wastes which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up on contact with air, and being then liable to catch fire.

H 4.3 Substances or wastes which, in contact with water emit flammable gases

Substances or wastes which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

H 5.1 Oxidizing

Substances or wastes which, while in themselves not necessarily combustible, may, generally by yielding oxygen cause, or contribute to, the combustion of other materials.

H 5.2 Organic Peroxides

Organic substances or wastes which contain the bivalent-o-o-structure are thermally unstable substances which may undergo exothermic self-accelerating decomposition.

H 6.1 Poisons (acute)

Substances or wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact.

H 6.2 Infectious substances

Substances or wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animals or humans.

H 8 Corrosives

Substances or wastes which, by chemical action, will cause severe damage when in contact with living tissue, or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport; they may also cause other hazards.

H 10 Liberation of toxic gases in contact with air or water

Substances or wastes which, by interaction with air or water, are liable to give off toxic gases in dangerous quantities.

H 11 Toxic (delayed or chronic)

Substances or wastes which, if they are inhaled or ingested or if they penetrate the skin, may involve delayed or chronic effects, including carcinogenicity).

H 12 Eco-toxic

Substances or wastes which if released, present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation or toxic effects upon biotic systems or both.

H 13 Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above.

HAZARDOUS CHARACTERISTICS DEFINITION AS PER RULE 2016R

List of Hazardous Characteristics

Code Characteristic

H1 Explosive

An explosive substance or waste is a solid or liquid substance or waste (or mixture of substances or wastes) which is in itself capable by chemical reaction of producing gas at such a temperature and pressure and at such a speed as to cause damage to the surrounding.

H3 Flammable liquids

The word “flammable” has the same meaning as “inflammable”. Flammable liquids are liquids, or mixtures of liquids, or liquids containing solids in solution or suspension (for example, paints, varnishes, lacquers, etc. but not including substances or wastes otherwise classified on account of their dangerous characteristics) which give off a flammable vapour at temperatures of not more than 60.5°C, closed-cup test, or not more than 65.6°C, open-cup test. (Since the results of open-cup tests and of closed-cup tests are not strictly comparable and even individual results by the same test are often variable, regulations varying from the above figures to make allowance for such differences would be within the spirit of this definition).

H4.1 Flammable solids

Solids, or waste solids, other than those classed as explosives, which under conditions encountered in transport are readily combustible, or may cause or contribute to fire through friction.

H4.2 Substances or wastes liable to spontaneous combustion

Substances or wastes which are liable to spontaneous heating under normal conditions encountered in transport, or to heating up on contact with air, and being then liable to catch fire.

H4.3 Substances or wastes which, in contact with water emit flammable gases

Substances or wastes which, by interaction with water, are liable to become spontaneously flammable or to give off flammable gases in dangerous quantities.

H5.1 Oxidizing

Substances or wastes which, while in themselves not necessarily combustible, may, generally by yielding oxygen cause, or contribute to, the combustion of other materials.

H5.2 Organic Peroxides

Organic substances or wastes which contain the bivalent-o-o-structure are thermally unstable substances which may undergo exothermic self-accelerating decomposition.

H6.1 Poisons (acute)

Substances or wastes liable either to cause death or serious injury or to harm human health if swallowed or inhaled or by skin contact.

H6.2 Infectious substances

Substances or wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animals or humans.

H8 Corrosives

Substances or wastes which, by chemical action, will cause severe damage when in contact with living tissue, or, in the case of leakage, will materially damage, or even destroy, other goods or the means of transport; they may also cause other hazards.

H10 Liberation of toxic gases in contact with air or water

Substances or wastes which, by interaction with air or water, are liable to give off toxic gases in dangerous quantities.

H11 Toxic (delayed or chronic)

Substances or wastes which, if they are inhaled or ingested or if they penetrate the skin, may involve delayed or chronic effects, including carcinogenicity).

H12 Eco-toxic

Substances or wastes which if released, present or may present immediate or delayed adverse impacts to the environment by means of bioaccumulation or toxic effects upon biotic systems or both.

H13 Capable, by any means, after disposal, of yielding another material, e.g., leachate, which possesses any of the characteristics listed above.



Ministry of Housing & Urban Affairs
Govt. of India



Ministry of Environment, Forests &
Climate Change, Govt. of India

Appendix - C

HAZARDOUS & OTHER WASTES MANAGEMENT

PROPOSED OPERATING PRACTICE



Central Pollution Control Board



National Productivity Council

DISCLAIMER

Standard Operating Procedures are as of date awaited. In this document are indicative proposed operating practices for reference only as being reflected for consideration (in the context of some practices being adopted in a few countries) towards potential adaptation until the standard operating procedures are formulated in India.

Introduction:

Hazardous wastes generated from the industrial activities may have greater impact on the surrounding environment, if not managed properly. There have been instances when hazardous wastes are being disposed indiscriminately and have resulted in not only the pollution of natural resources but also affect human health, as well. In order to manage such wastes in environmentally sound manner, it is important to develop operating practices which may be followed by the occupiers. Keeping this in view, some proposed operating practices (POPs) have been developed to help generators/occupiers of Hazardous and Other Wastes to manage their wastes in environmentally safe manner, in the context, as per the Rules, 2016.

A Proposed Operating Practice (POP) is a set of written instructions that document a routine or repetitive activity followed by an organization. The development and use of POPs are an integral part of a successful quality system as it provides individuals with the information to perform a job properly, and facilitates consistency in the quality and integrity of a product or end-result. The term “POP” may not always be appropriate and terms such as protocols, instructions, worksheets, and laboratory operating practices may also be used. For the purposes of this Guidance, the term, “POP” will be used.

In this Appendix there are several POPs to be customized by individual waste generation facilities. Any wording in these documents that requires facility specific information such as the facility name has been highlighted in yellow for ease of personalization.

These documents are not intended to be a comprehensive discussion on Hazardous Wastes, but will focus on practical considerations and requirements for the handling, labeling, and storage of, and communication regarding, hazardous wastes within a occupier’s operational areas.

The following POPs are included in the Appendix of this guide for reference at this stage:

- POP 1: Hazardous Waste Management
- POP 2: Required Weekly Self-Inspections for Hazardous Waste Accumulation
- POP 3: Recommended Monthly Self-Inspections for Hazardous Waste Accumulation
- POP 4: Recommended Yearly Self-Inspections for Hazardous Waste Accumulation
- POP 5: Recommended Hazardous Waste Record keeping Annual Checklist
- POP 6: Used Oil Management

POP 1: HAZARDOUS WASTE MANAGEMENT

Effective Date: _____

Reviewed by: _____

PURPOSE:

This Proposed Operating Practice ("POP") is intended to:

- Ensure waste is properly characterized to determine if it is hazardous as per Schedule I, Schedule II & Schedule III of Rules, 2016.
- Ensure that employees are properly managing hazardous wastes generated at the facility.
- Ensure containers accumulating hazardous waste are properly managed.
- Ensure that accumulation storage times are not exceeded.
- Ensure that hazardous wastes are not disposed of in the refuse or trash other than specified storage containers.
- Ensure personnel are trained to manage hazardous waste.

Scope:

This POP seeks to highlight procedures for waste characterization and appropriate handling and labeling and storage procedures for hazardous waste generated at the facility. It also addresses how satellite accumulation and long term (90-day or 180-day accumulation) are monitored; the use of appropriate equipment to store hazardous waste and training of personnel.

Responsibilities:

With regard to the responsibilities of hazardous & other wastes is concerned, it varies from generator to transporter and waste disposer. At every step, proper care has to be taken to minimize environmental impacts.

This POP identifies the responsibilities of JOB CATEGORY. Only trained personnel are authorized to carry out the procedures contained in this POP.

Provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.

Responsibilities of Generator/Occupier:

PROCEDURE:

The facilities must develop a policy for effective hazardous waste management. The policy is to manage hazardous waste in the following manner:

Hazardous Waste Characterization



Each facility manages chemicals, which, when become wastes, may be considered hazardous wastes. It is required to determine whether these wastes meet the definition of “hazardous waste.” This determination may be performed by either testing representative samples of routine, predictable (and in some cases periodic) waste streams. Alternatively, the hazardous waste determination can be made by using knowledge of the chemicals and processes involved.

To determine if a waste is hazardous, perform the following steps:

- STEP 1:** Determine whether the waste is excluded from regulation.
- STEP 2:** If the waste is not excluded from regulation, determine whether the waste is listed as a hazardous waste in Schedule I list of processes. A listed waste may include used oil, unused commercial chemical or off-specification product, and a spent solvent used for degreasing.
- STEP 3:** If the waste is not listed in Schedule 1, determine whether it exceeds the leachable concentration limits of TCLP or STLC (Class A) or TTLC (Class B) as prescribed under Schedule II
- STEP 4:** If the waste is not listed as a hazardous waste, determine whether it exhibits a hazardous characteristic (i.e., ignitable, corrosive, reactive, or toxic) as described under Class C of Schedule II by using knowledge of the waste or performing one of the following tests using NABL certified or MOEF&CC registered laboratory. It is often helpful to review of the Material Safety Data Sheet (MSDS) to determine the hazardous characteristics of a hazardous material that later becomes a hazardous waste. A description of some of the waste characteristics is provided below.

Ignitability

A waste is ignitable if a representative sample is easily combustible or flammable or if burnt it burns so vigorously that it creates a hazard. A waste is ignitable if it is:

- A liquid, other than an aqueous solution containing less than 24 percent alcohol by volume, with a flash point of less than 140 degrees Fahrenheit (°F).
- A non-liquid capable under standard temperature of causing fire by means of friction, absorption or moisture, or spontaneous chemical changes and which when ignited burns so vigorously and persistently that it creates a hazard.
- An ignitable waste is assigned under Schedule II as Hazardous Waste Class C1 - Flammable

Corrosive

A waste is corrosive if a representative sample dissolves metals and other materials or burns the skin or eye on contact. A waste is corrosive if:

- (I) it is aqueous and has a pH less than or equal to 2 or greater than or equal to 12.5;

- (ii) it is a liquid and corrodes steel (SAE 1020) at a rate greater than 6.35 mm per year at a test temperature of 55 °C;
- (iii) it is not aqueous and, when mixed with an equivalent weight of water, produces a solution having a pH less than or equal to 2 or greater than or equal to 12.5;
- (iv) it is not a liquid and, when mixed with an equivalent weight of water, produces a liquid that corrodes steel (SAE1020) at a rate greater than 6.35 mm per year at a test temperature of 55 °C.
Note: For the purpose of determining the corrosivity, the Bureau of Indian Standard 9040 C method for pH determination, NACE TM 01 69 : Laboratory Corrosion Testing of Metals and EPA 1110A method for corrosivity towards steel (SAE1020) to establish the corrosivity characteristics.
- (v) A corrosive waste is assigned under Schedule II as Hazardous Waste Class C 2

Reactivity or Explosive

A waste is reactive if it is unstable or undergoes rapid or violent chemical reactions such as catching fire, exploding or giving off fumes when exposed to or mixed with water, air or other materials. A reactive waste:

- Is normally unstable and readily undergoes violent change without detonating.
- Reacts violently with water.
- It forms potentially explosive mixtures with water.
- When mixed with water, it generates toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
- It is a cyanide or sulfide bearing waste which, when exposed to pH conditions between 2 and 12.5, can generate toxic gases, vapors or fumes in a quantity sufficient to present a danger to human health or the environment.
- It is capable of detonation or explosive reaction if it is subject to a strong initiating source or if heated under confinement.
- It is readily capable of detonation or explosive decomposition or reaction at standard temperature and pressure.
- Wastes as described above are assigned under Schedule II as Hazardous Waste Class C 3

Toxicity

A waste exhibits the characteristic of toxicity, if:-

- (i) the concentration of the waste constituents listed in Class A and B (of this schedule) are equal to or more than the permissible limits prescribed therein;
- (ii) it has an acute oral LD50 less than 2,500 milligrams per kilogram;

- (iii) it has an acute dermal LD50 less than 4,300 milligrams per kilogram;
- (iv) it has an acute inhalation LC50 less than 10,000 parts per million as a gas or vapour;
- (v) it has acute aquatic toxicity with 50% mortality within 96 hours for zebra fish (*Brachidaniroerio*) at a concentration of 500 milligrams per litre in dilution water and test conditions as specified in BIS test method 6582 – 2001.
- (vi) it has been shown through experience or by any standard reference test- method to pose a hazard to human health or environment because of its carcinogenicity, mutagenicity, endocrine disruptivity, acute toxicity, chronic toxicity, bio-accumulative properties or persistence in the environment.
- (vii) Wastes as described above are assigned under Schedule II as Hazardous Waste Class C 4

Generally, Hazardous wastes are disposed of in the Centralized Treatment, Storage & Disposal Facility (TSDF). The facility owners provide the identification number to each generator. Hazardous waste generators must have an identification number. This number identifies each generator on hazardous waste manifests and other paperwork. The identification number enables regulators to track the waste from origin to final disposal. These numbers are site-specific and there must be only one number at a single address.

The Hazardous Wastes should be analyzed as per the Manual developed by CPCB on “Sampling, Analysis and Characterization of Hazardous Wastes”, 2014 and test methods given in “Uniform Testing Procedure for Analysis of Hazardous Waste samples”.

Hazardous Waste Storage

Under the hazardous waste requirements and to maintain its status as a small or large quantity generator, facilities must perform the following activities:

Storage Time Limits

The occupiers of facilities generating hazardous & other wastes may store for a period of not more than ninety (90) days and a maximum quantity of ten (10) tons. The State Pollution Control Board (SPCB)/Pollution Control Committee (PCC) may extend the said period of ninety days in the following cases:

- a. Small generators (up to ten tons per annum) up to one hundred and eighty (180) days of their annual capacity;
- b. Actual users and disposal facility operators up to one hundred and eighty (180) days of their annual capacity;
- c. Occupiers who do not have access to any TSDF in the concerned State; or

- d. The waste which needs to be specifically stored for development of a process for its recycling, recovery, pre-processing, co-processing or utilization;

In any case on justification grounds up to one hundred and eighty (180) days which can be on case to case basis.

Storage time limits for hazardous waste depend on the facility's generator status. As mentioned above, most occupiers store facilities operate under small quantity generator status.

In addition to above, based on International standard, Storage Requirements may also have following feature:

- Not more than 10 ton or 10,000 kg of hazardous waste may be stored onsite at any one time
- Up to 200 kg or one drum of hazardous waste may be kept "at or near" the location where it is generated at the onsite, for safety purpose. Once 200 kg or one drum of a particular hazardous waste are generated, the waste must be moved (within 3 days) to the long term storage area at the facility site (90 days or 180-days, as the case may be).
- In no instance can hazardous wastes be stored for more than 360 days or one year from the time of initial storage, with authorization, as per the SPCB/PCC's directives.
- The storage start date at the Onsite Storage Area and the storage facility must be clearly marked and visible for inspection on each storage unit.

Container Storage

If hazardous waste is stored in containers, a generator must ensure:

- Storage is in closed containers that are in good condition and compatible with the waste.
- Containers are properly labeled. Each container in which hazardous waste is stored must be labeled with the following information:
 - o The words "Hazardous Waste"
 - o Storage start dates, with such date being visible for inspection:
 - The date that the first drop or particle enters the container at the Satellite Storage Area, which starts the one-year clock for storage.
 - Full Date: The date that the drum at the Satellite Storage Area is full (up to 200 lit of each type of hazardous waste or one quart of each type of acutely or extremely hazardous waste), which starts the three-day clock for moving wastes from the Satellite Storage Area to the longer-term storage area.
 - Arrival Date: The date that the full drum arrives at the long-term storage area.
 - o Composition and physical state of the waste, i.e. solid, liquid;
 - o Statement or statements that call attention to the particular hazardous properties of the

- o waste (e.g. flammable, reactive); and
- o Name and address of the generator.
- Weekly container inspections for compliance verification purposes.
- Manage containers to avoid ruptures or leaks.
- Place containers holding ignitable or reactive wastes at least 15m (50ft) from the facility's property line and incompatible wastes must be separated by a berm or wall.
- Ensure that each waste is stored in a suitable container and keep waste segregated to not mix incompatible materials.
- Keep containers securely covered at all times except to add or remove wastes and store liquid waste containers on secondary containment pallets.

Tank Storage

If hazardous waste is stored in aboveground storage tanks (ASTs) for bulk quantity, occupiers must ensure:

- Hazardous waste must not be stored in the tank for more than 90 or 180 days, as the case may be.
- Tanks must be designed to hold hazardous waste and not collapse or leak.
- Closed tanks must be in good condition and compatible with the waste.
- Each AST in which hazardous waste is stored must be labeled with the following information:
 - o The words "Hazardous Waste"
 - o Storage start date
 - o Composition and physical state of the waste (liquid, solid or gas)
 - o Hazardous properties of the waste (e.g., reactive or ignitable)
 - o Name, address, and Waste Category (as per Schedule I)
 - o Identification number of the occupier/facility owner
 - o No smoking signs must be conspicuously displayed where ignitable or reactive wastes are stored in tanks

Inspections:

- o Above ground portions of the tank system and construction materials of the tank and in the area immediately surrounding the tanks (e.g., dikes) must be checked at least daily to detect corrosion or leaking unless leak detection systems are installed. If such systems are



installed, Construction materials of the tank and in the area immediately surrounding the tanks (e.g., dikes) must be checked at least weekly.³

- o Data must be gathered from monitoring equipment at least once each operating day to ensure that the tank is being operated according to its design
- o Secondary containment systems must be inspected at least once each operating day

Secondary Containment:

- Most tanks and tank systems must have secondary containment. Secondary containment can include a liner, vault or double-walled tank. Appurtenances also must be contained. Secondary containment systems must be able to contain 100% of the capacity of the largest tank plus maximum rainwater (if outside) from a 25-year, 24-hour rainfall.

Waste Feed Cutoff:

- Where hazardous waste is continuously fed into a tank, the tank must be equipped with a means to stop this inflow (e.g., waste feed cutoff system or by-pass system to a stand-by tank).

Empty Container Management

A container or an inner liner removed from a container that has held any hazardous waste is "empty" as per Waste Category No. 33.1 of Schedule 1 if:

- 1) All wastes have been removed that can reasonably be removed by inverting the container or chipping it out; OR
- 2) The container or inner liner has been triple rinsed using a solvent capable of removing the waste and all pourable residues have been removed.



As per the Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016, the occupier and/or owner of the TSDF are required to dispose of, such empty containers and liners, in environmentally sound manner. The empty containers of hazardous chemicals may also be used to store the hazardous wastes generated in their industry/facility. However, the compatibility has to be looked into before storing hazardous wastes in these containers. The liner of the containers has to be disposed of in authorized TSDF. The examples of incompatible chemicals are given below:

- Flammables and oxidizers;
- Elemental metals and hydrides;

- Cyanides and Acids;
- Sulfides and Acids;
- Bases and Acids;
- Chlorine compounds and Acids;
- Elemental Metals and Acids;
- Chlorine compounds and Amines;
- Air or Water Reactives and Anything;
- Organic Peroxide and Anything.

Disposal

Hazardous wastes must be legally transported and disposed of in authorized Treatment Storage Disposal Facility (TSDF) in their region.

Training

Training Requirements

Occupiers and/or Owner & Operator of Facilities must ensure that all employees are thoroughly familiar with proper waste handling and emergency procedures, relevant to their responsibilities during normal facility operations and emergencies. The employees handling hazardous wastes must be trained at least in the following areas:

- Waste minimization techniques and procedures;
- Identification & characterization of hazardous wastes;
- Handling and storage procedures;
- Emergency procedures in case of accidents while handling hazardous wastes;
- General procedures for containment system for spillages and/or leakages of hazardous wastes;
- Recording and reporting procedures;

At a minimum, the training program must be designed to ensure that facility personnel are able to respond effectively to emergencies by familiarizing them with emergency procedures, emergency equipment, and emergency systems, including, where applicable:

- Using, inspecting, repairing, and replacing emergency and monitoring equipment
- Key parameters for automatic waste feed cutoff systems
- Communications or alarm systems
- Response to fire or explosions

- Response to groundwater contamination incidents
- Shutdown of operations

Record keeping

Several documents must be maintained by generators/occupiers and available upon request. Generally, the following documents must be kept for at least three (3) years or as defined by the authorities:

- Hazardous waste manifests
- Hazardous waste determinations
- Bills of recyclable wastes (e.g., for used oil shipments) or receipts for empty containers, etc.
- Receipts for one-time wastes
- Documentation for weekly inspections for hazardous waste containers
- Documentation for inspections of hazardous waste tanks
- Training program and records of employee training
- Hazardous Waste Contingency plan, if applicable
- Hazardous Waste Source Reduction/Waste Minimization Plans and Progress Reports
- Annual returns

Submitting annual returns as per Rule 20 is required for a generator/occupier who ships any hazardous waste to a Transfer Storage Disposal Facility (TSDF) within the country.

- The annual return must be filled on 30th day of June of every year giving details of hazardous waste generation, transported and disposed.

Copies of annual return must be retained for at least three (3) years.

Manifesting

A Uniform Colour coded Hazardous Waste Manifest (or Manifest) is a shipping document that travels with hazardous waste from the point of generation, through transportation, to the final treatment, storage, and disposal facility (TSDF). Each party in the chain of custody, including the generator, signs and keeps a copy of the manifest for tracking purposes. Hazardous Waste Identification(Waste Category) numbers are needed by all parties that sign the manifest. The hazardous waste transporters must be registered as per the Motor Vehicle Act, 1980 as amended time to time.

A final signed copy of the manifest must be returned to the generator by the TSDF and the

generator is responsible for sending a copy of that signed manifest to SPCB within 30 days of waste shipment.

There are seven copies of Manifest. An additional copy has been introduced in the Rules, 2016 to take care in case waste is being transported in another state from the place of origin. In such case, one copy has to be sent to the SPCB of the concerned state where the waste has to be shipped. The following table shows the color coded manifest system.

Copy number with Colour code	Purpose
(1)	(2)
Copy 1 (White)	To be forwarded by the sender to the SPCB after signing all the seven copies
Copy 2 (Yellow)	To be retained by the sender after taking signature from the transporter and the rest of the five signed copies to be carried by the transporter
Copy 3 (Pink)	To be retained by the receiver (actual user or TSDF operator) after receiving the waste and the remaining four copies are to be duly signed by the received.
Copy 4 (Orange)	To be handed over to the transporter by the receiver after accepting waste.
Copy 5 (Green)	To be sent by receiver to the SPCB
Copy 6 (Blue)	To be sent by receiver to the sender
Copy 7 (Grey)	To be sent by receiver to the SPCB of the sender in case the sender is in another state

Common Manifest Errors:

Errors with manifests can lead to inaccuracy in hazardous waste data and hazardous waste management, misdirected enforcement, incorrect data about the facility operation, paying of correction fees. Below is a summary of common manifest errors to be aware of, so as to improve manifest practice and keep the errors to a minimum.

- Incorrect, invalid, or inactive generator/occupier ID number.
- Failure to verify ALL information on a pre-printed manifest at shipment.
- Failure to delete entire pre-printed information for waste not transported.
- Incorrect or incomplete container, total quantity and/or unit weight information.
- Waste codes incorrect or incomplete.
- Failure to sign and/or date the manifest.
- Incorrect or incomplete dates; past dates or future dates.

- Transporter signs in wrong signature line.
- Failure to submit a legible copy.
- Generator fails to submit a report to SPCB when a signed facility copy is not received by the generator within 45 days.

Hazardous Waste Transportation Requirements

Generally, the hazardous wastes are being collected by the owners of TSDF who has dedicated transportation fleet. However, in case, the occupier wishes to transport on its own then he should follow the provisions of Motor Vehicle Act, 1980 as amended time to time. When shipping hazardous waste on public roads, facilities/occupiers must:

- Only use TSDF facilities that are authorized by the SPCB and have obtained an ID number.
- The transporter must comply with the Motor Vehicle Act, 1980 as amended time to time requirements for packaging, labeling, training, and placarding as follows:
 - **Packaging:** Hazardous waste must be packaged in containers that are in sound condition and are designed or maintained to contain hazardous waste.
 - **Labeling:** Hazardous materials and hazardous waste containers must be marked in order to identify their contents and the hazard(s) posed by them in accordance with requirements. Transportation vehicles must be placarded on all four sides of the vehicle. If the waste shipment includes more than one hazard class, multiple placards must be used to indicate all the hazard classes.

The following table shows good and bad management practices for hazardous wastes.

Hazardous Waste Management - Good and Bad Practices

Good Practices	Bad Practices
A waste segregation program is in place for all wastes, and a goal of this program is to isolate and reduce the amount of hazardous wastes generated. This can provide disposal cost savings.	No waste separation program is in place.
Hazardous wastes are collected by a fully trained and authorized waste handler and records (i.e. waste manifests) of this disposal are fully maintained.	The hazardous waste collector is not fully trained and authorized or hazardous waste is mixed/collected along with general waste.
Hazardous wastes are stored in a safe and secure manner.	Hazardous wastes are not stored in a safe and secure manner (i.e. outside, not protected from the environment)
Documented training is provided to all workers on the proper separation, handling, storage, and disposal of hazardous waste. Only authorized (trained) employees handle hazardous waste.	The occupier and/or Owner/Operator of facility does not provide training on the proper handling of hazardous wastes.

The following table provides routine checkup list for effective management of hazardous wastes.

S. No.	Hazardous Waste Management Check list	Checked
1	All hazardous waste streams identified and properly segregated	
2	Applicable authorization relating to hazardous waste generation, storage and disposal have been obtained.	
3	Hazardous wastes are being collected by a authorized waste handler and records (i.e. waste manifests) disposal are properly maintained on-site.	
4	Hazardous wastes are being stored in areas that have all required safety features and protections including: <ul style="list-style-type: none">▪ Impervious surfaces and secondary containment.▪ Proper signage and labels on all waste containers.▪ Protection measures from fire risks.▪ Area is well ventilated.▪ Wastes are protected from direct sunlight or other weather conditions.▪ Only authorized/trained persons are able to access storage areas.▪ Spill clean-up equipment is in place and readily available.	
5	Workers required to handle hazardous wastes are wearing the appropriate PPE.	
6	An emergency shower and/or eyewash station is located near the location hazardous wastes are being handled.	

References:

1. CPCB Manual on Sampling, Analysis and Characterization of Hazardous Wastes, 2014.
2. Uniform Testing procedure for analysis of Hazardous Waste Samples, CPCB.
3. OHSAS 18000: Occupational Health and Management Systems.
4. ISO 14000 – Environment Management Systems

POP 2: Required Weekly Self-Inspections for Hazardous Waste Storage

Effective Date: _____

Reviewed by: _____

PURPOSE:

Hazardous waste regulations require facilities that generate and store hazardous waste and are authorized as a generator to perform weekly inspections of hazardous waste storage areas. This procedure has been designed to aid in complying with the required weekly inspection of the hazardous waste storage area and to provide guidance on what needs to be inspected. This is a guide and not a comprehensive one which can be updated based on the facility requirements.

ROLES AND RESPONSIBILITIES: List out roles and responsibilities of persons responsible for the activities.

PROCEDURE:

Ensure compliance with the following checklist by:

- Printing the checklist.
- Inspecting the checklist items weekly to determine if the area and contents are in compliance. Include the location, date, and inspector's name.
- If corrective actions are necessary, note the issue and action required on the checklist and then make the correction immediately if possible or call for assistance.
- Keeping signed checklists on file for a minimum of three years.

Location: _____

Date: _____

Inspector's Name: _____

Table - Weekly Self-Inspections for Hazardous Waste Storage

Topic	Action Item	Compliance (Y/N)	Action to be taken	Remarks
Signage	<p>The following signs are displayed in the permitted storage area:</p> <ol style="list-style-type: none"> 1) "Hazardous Waste Storage Area" 2) "No Smoking Within 50 Feet" 3) "Authorized Personnel Only" 			
Emergency Equipment	<p>The following emergency equipment is sited adjacent to the area where immediate access is available:</p> <p>Required:</p> <ol style="list-style-type: none"> 1) Internal communications equipment or alarm system 2) Telephone, or two-way radio capable of summoning emergency assistance from local emergency personnel 3) Portable fire extinguishers and other fire control equipment (foam, dry chemicals, etc.) 4) Water supply with adequate volume and pressure for fire suppression 5) Spill control equipment 6) Decontamination equipment 			
Emergency Equipment Recommended:	<p>Recommended:</p> <ol style="list-style-type: none"> 1) Empty "overpack" drum 2) Gloves 3) Goggles 4) Face Shield 5) Absorbent pads, socks and booms 6) Disposable bags 7) Spill response pocket guide or posters reflecting the same 8) Eye wash/shower 9) First aid kit 			
	<p>Safety and emergency equipment is tested, well maintained, and in good working order</p>			
Aisle Space	<p>Adequate aisle space is provided to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of operation in an emergency.</p>			

Emergency Contacts	The following information is posted next to the telephone: 1) Name and telephone number of emergency contact 2) Location of fire extinguisher 3) Telephone number of local fire department
Empty Containers	Containers are adequately emptied of hazardous waste prior to disposal. <ul style="list-style-type: none"> • All wastes have been removed that can reasonably be removed by inverting the container or chipping it out; OR • For containers that held an acute hazardous waste, the container or inner liner has been triple rinsed using a solvent capable of removing the waste and all pourable residues have been removed.
Waste Staging Area	The hazardous waste transfer, storage and generation areas are maintained and operated to minimize the possibility of any unplanned releases of hazardous waste or waste constituents which could threaten human health or the environment. Safety and emergency communications equipment are tested, well maintained, and in good working order in all areas. Ignitable and reactive hazardous wastes are located at least 50 feet from the facility's property line.
Secure Containers	Containers of hazardous waste are closed at all times unless waste is being added or removed. (Inspect both Satellite Storage Area and long term storage)
Storage	Storage conditions are adequate and adhere to the basics of Hazardous Waste storage practices: <ul style="list-style-type: none"> • Hazardous wastes are collected at or near the point of generation (Satellite Storage Area) • Containers are labeled with the words "Hazardous Waste." • Containers clearly indicate the accumulation start date by which the first drop or particle of waste was added to the container. • Labels clearly show the contents of the hazardous waste, physical hazards associated

with the waste, physical state of the waste, and generator name, address, and Waste Identification number.

- All containers that store hazardous waste are in good physical condition and are compatible with the type of waste.

Containers in satellite storage areas are labeled and stored at or near the point of waste generation and are under the control of the operator.

Accumulation times do not exceed allowable storage quantities (200 kg).

Storage Times

Hazardous wastes are stored in the long-term storage area less than 90-days or 180-days for small quantity generators.

Hazardous wastes at Satellite Storage Areas are stored onsite for less than one year.

POP 3: RECOMMENDED MONTHLY SELF-INSPECTIONS FOR HAZARDOUS WASTE STORAGE

Effective Date: _____

Reviewed by: _____

PURPOSE:

ROLES AND RESPONSIBILITIES:

PROCEDURE:

Ensure compliance with the following checklist by:

- Printing the checklist.
- Inspecting the checklist items yearly to determine if the area and contents are in compliance. Include the location, date, and inspector's name.
- If corrective actions are necessary, performing them immediately or call TITLE for assistance.
- Keeping signed checklists on file for a minimum of three years.

Location: _____

Date: _____

Inspector's Name: _____

Monthly Self-Inspections for Hazardous Waste Storage

Topic	Action Item	Compliance (Y/N)	Action to Remarks be taken
Signage	<p>The following signs are displayed in the permitted storage area:</p> <ol style="list-style-type: none"> 1) "Hazardous Waste Storage Area" 2) "No Smoking Within 50 Feet" 3) "Authorized Personnel Only" 		
Emergency Equipment	<p>The equipment as required as per ISO – 18000 or Health & Safety regulations. However, at least, the following emergency equipment is sited adjacent to the area where immediate access is available:</p> <p>Required:</p> <ol style="list-style-type: none"> 1) Internal communications equipment or alarm system 2) Telephone, or two-way radio capable of summoning emergency assistance from local emergency personnel 3) Portable fire extinguishers and other fire control equipment (foam, dry chemicals, etc.) 4) Water supply with adequate volume and pressure for fire suppression 5) Spill control equipment 6) Decontamination equipment 		
Emergency Equipment Continued:	<p>Recommended:</p> <ol style="list-style-type: none"> 1) Empty "overpack" drum 2) Gloves 3) Goggles 4) Face Shield 		
Recommended:	<ol style="list-style-type: none"> 5) Absorbent pads, socks and booms 6) Disposable bags 7) Spill response pocket guide or posters reflecting the same 8) Eye wash/shower 9) First aid kit <p>Safety and emergency equipment is tested, well maintained, and in good working order</p>		
Aisle Space	<p>Adequate aisle space is provided to allow the unobstructed movement of personnel, fire protection equipment, spill control</p>		

equipment and decontamination equipment to any area of operation in an emergency.

**Emergency
Contacts**

The following information is posted next to the telephone: 1) Name and telephone number of emergency contact
2) Location of fire extinguisher
3) Telephone number of local fire department

**Empty
Containers**

Containers are adequately emptied of hazardous waste prior to disposal.
All wastes have been removed that can reasonably be removed by inverting the container or chipping it out; OR
For containers that held an acute hazardous waste, the container or inner liner has been triple rinsed using a solvent capable of removing the waste and all pourable residues have been removed.

**Waste
Staging
Area**

The hazardous waste transfer, storage and generation areas are maintained and operated to minimize the possibility of any unplanned releases of hazardous waste or waste constituents which could threaten human health or the environment. Safety and emergency communications equipment are tested, well maintained, and in good working order in all areas.
Ignitable and reactive hazardous wastes are located at least 50 feet from the facility's property line.

**Secure
Containers**

Containers of hazardous waste are closed at all times unless waste is being added or removed.
(Inspect both Onsite and long term storage areas)

Storage

Storage conditions are adequate and adhere to the basics of Hazardous Waste storage practices:

- Hazardous wastes are collected at or near the point of generation
- Once 200 lit or a drum of hazardous wastes are stored, they must be moved to the 90-day or 180-day staging area(s) or long term storage area.
- Containers are labeled with the words

“Hazardous Waste.”

- Containers clearly indicate the storage start date by which the first drop or particle of waste was added to the container.
- Labels clearly show the contents of the hazardous waste, physical hazards associated with the waste, physical state of the waste, and generator name, address, and Waste Identification number.
- All containers that store hazardous waste are in good physical condition and are compatible with the type of waste.

Containers in onsite storage areas are labeled and stored at or near the point of waste generation and are under the control of the operator. Storage times do not exceed allowable storage quantities (200 lit or a drum at point of generation and 1o Ton at long term storage area).

Storage
Times

Hazardous wastes are stored in the long-term storage area less than 90-days or 180-days, as the case may be.
Hazardous wastes at Storage Areas are stored onsite as authorized by SPCBs/PCCs.

POP 4: RECOMMENDED YEARLY SELF-INSPECTIONS FOR HAZARDOUS WASTE STORAGE

Effective Date: _____

Reviewed by: _____

PURPOSE:

PROCEDURE:

Ensure compliance with the following checklist by:

- Printing the checklist.
- Inspecting the checklist items yearly to determine if the area and contents are in compliance. Include the location, date, and inspector's name.
- If corrective actions are necessary, performing them immediately or call for assistance.
- Keeping signed checklists on file for a minimum of three years.

Location: _____

Date: _____

Inspector's Name: _____

Table - : Yearly Self-Inspections for Hazardous Waste Storage

Topic	Action Item	Compliance (Y/N)	Action to Remarks be taken
Generator Status	Facility is registered as a Generator of hazardous waste.		
Characterization	All potentially hazardous waste streams generated have been fully characterized.		
Manifests	Manifests are properly prepared and are attached to the signed copy returned from TSDf. Copies of manifests must be maintained onsite.		
Aisle Space	Adequate aisle space is provided to allow the unobstructed movement of personnel, fire protection equipment, spill control equipment and decontamination equipment to any area of operation in an emergency.		
Empty Containers	Containers are adequately emptied of hazardous waste prior to disposal. <ul style="list-style-type: none"> • All wastes have been removed that can reasonably be removed by inverting the container or chipping it out; OR • For containers that held an acute hazardous waste, the container or inner liner has been triple rinsed using a solvent capable of removing the waste and all pourable residues have been removed. 		
Disposal	Hazardous wastes are legally transported, manifested disposed of at authorized Treatment Storage Disposal Facility (TSDf).		

POP 5: RECOMMENDED HAZARDOUS WASTE RECORDKEEPING ANNUAL CHECKLIST

Effective Date: _____

Reviewed by: _____

PURPOSE:

Several documents must be maintained by generators and available upon request by authorities.

ROLES AND RESPONSIBILITIES:

PROCEDURE:

Generally, the following documents must be kept for at least three (3) years:

- Hazardous waste manifests
- Exception reports for manifests; documentation of non-receipt of signed copy of manifest
- Hazardous waste determinations
- Bills of sending waste to recyclers (e.g., for used oil shipments)
- Receipts for one time wastes generation
- Documentation for inspections for hazardous waste tanks

Other miscellaneous documents that facilities must be kept include:

- Documentation for weekly inspections for hazardous waste containers
- Training program and records of employee training
- Hazardous Waste Contingency plan, if applicable
- Excluded recyclable materials reports
- Documentation of hazardous waste amounts that qualify the facility that generates less 10 ton per year

Annual Return

Submitting an annual return is required for an Occupier who ships any hazardous waste to a Transfer Storage Disposal Facility (TSDF) within the country and Owner of TSDF.

- The report is due by 30th September of each year and covers the previous year of hazardous waste activity.
- Copies must be retained for three (3) years.

Ensure compliance with the following checklist by:

- a. Printing the checklist.
- b. Inspecting the checklist items to determine if the area and contents are in compliance. Include the location, date, and inspector's name.
- c. If corrective actions are necessary, performing them immediately or call for assistance.
- d. Keeping signed checklists on file for a minimum of three years.

Location: _____

Date: _____

Inspector's Name: _____

Table - : Hazardous Waste Recordkeeping Annual Checklist

Topic	Action Item	Compliance (Y/N)	Action to Remarks be taken
Authorization	Hazardous waste Authorization Number is current and in good standing.		
Record Keeping	<p>Manifests are retained for three years from the date the waste was accepted by the initial hauler</p> <p>Hazardous waste determination records (test results, analyses, and other hazardous waste determinations) are retain for three years from date waste sent to an on-site or off-site treatment, storage, or disposal facility (TSDF).</p> <p>Annual return reports are retained for three years from the due date of the report</p>		
Recommended BMP	<p>Copy of correspondence to SPCB indicating that Occupier has not received confirmation of delivery to TSDF via a signed manifest returned to the Occupier.</p> <p>Bills of wastes sent to recyclers (e.g., for used oil shipments) are retained for three years.</p> <p>Documentation for inspections of hazardous waste tanks and 90-/180-day storage areas are retained for 3 years.</p> <p>Training records pertaining to hazardous waste handling and emergency response are retained for 3 year</p>		
Best Management Practice	<p>Documentation of hazardous waste amounts that qualify the facility as a SQG are retained 3 years</p> <p>Hazardous Waste Contingency plan is current and reviewed annually.</p>		

POP 6: Used Oil Management

Effective Date: _____

Reviewed by: _____

PURPOSE:

As per Hazardous Other Wastes (Management & Transboundary Movement) Rules, 2016, the used oil has to be managed in environmentally safe manner. This POP describes management practices to ensure compliance with used oil management regulations. This POP does not address oils contaminated with polychlorinated biphenyls (PCBs).

PROCEDURE:

The personnel involved in handling and management of used oil may adhere to the following procedure:

- Label all used oil containers, portable tanks and stationary tanks as “Used Oil” and label the container or tank with the initial storage date and hazard properties.
- All fill ports for piping leading to storage tanks must be labeled with the words “Used Oil.” Ensure that all containers are in good condition and compatible with the storage of used oil.
- Ensure that used oil vessels and conveyances are properly managed to prevent oil leaks and spills.
- Ensure that used oil filters are managed either as hazardous waste or solid waste, under specified conditions.
- If a funnel is used in the bunghole of a container, it must either be removed when the container is not being added to (and the container closed), or be equipped with a valve or cover of some sort to prevent leakage if the drum should be turned over.

Refer to Hazardous Waste Management POP for your appropriate generator status and follow all requirements contained therein for both containers and tanks.

Definition of Used Oil: Any oil-

- (i) derived from crude oil or mixtures containing synthetic oil including spent oil, used engine oil, gear oil, hydraulic oil, turbine oil, compressor oil, industrial gear oil, heat transfer oil, transformer oil and their tank bottom sludges; and
- (ii) suitable for reprocessing, if it meets the specification laid down in Part A of Schedule V but does not include waste oil;

Examples of Used Oil as per Waste Category No. 5 of Schedule I of regulations include:

- Used or spent oil

- Wastes or residues containing oil
- Waste cutting oils

In order to help generators, a comprehensive list is being provided to help them in identifying used oils generated from their various activities for better handling and management of used oils, apart from the above waste types. These include:

- Used Motor Oils Used Industrial Oils Other Oils
- Vehicle crankcase oils Hydraulic oils Transformer oils
- Engine lubricating oils Compressor oils Refrigeration oils
- Transmission fluids Turbine oils Metalworking oils
- Gearbox and differential oils Bearing oils Railroad oils
- Gear oils Vegetable oils used for lubrication
- Waste synthetic oils that may be managed as used oil include:
 - o Oil derived from coal, oil shale, or polymers;
 - o Water-soluble petroleum-based oils;
 - o Vegetable or animal oil used as a lubricant;
 - o Hydraulic fluid;
 - o Heat transfer fluid.

Used oil does NOT include:

- Antifreeze,
- Brake fluid,
- Other automotive wastes,
- Fuels,
- Solvents.

Any oil that has been refined from crude oil, or any synthetic oil, that has been used and as a result of such use or as a consequence of extended storage, or spillage, is contaminated by physical or chemical impurities. Simply put, used oil is exactly what its name implies—any petroleum-based or synthetic oil that has been used.

Substances which are not regulated as used oils include which have otherwise being included under respective categories:

- Oils with a flashpoint below 100°F;
- Oils mixed with hazardous waste;

- Wastewater containing small amounts of used oil;
- Oily wastes that are not used oil;
- Oily wastewaters that are not used oil;
- Tank bottoms;
- Used oil processing bottoms;
- Used oil re-refining distillation bottoms;
- Cooking oils (edible);
- Grease;

How to Manage Oil Leaks and Spills: Spillages and leakages of oils are very common in industrial operations and may create messy sight if not managed properly. It is important for the occupiers to control and manage such spills and leakages immediately when it happens. Some of the best management practices are given below:

- Take steps to prevent leaks and spills. Keep machinery, equipment containers, and tanks in good working conditions and be careful when transferring used oil.
- Have sorbent materials available on site
- If a spill or leak occurs, stop the oil from flowing at the source.
- Contain any spilled oil. For example, containment can be accomplished by erecting sorbent berms or by spreading a sorbent over the oil.
- Clean up the oil and recycle the used oil as you would have before it was spilled. If recycling is not possible, you first must make sure the used oil is not a hazardous waste and dispose of it appropriately.
- All used cleanup materials, from rags to sorbent booms, that contain free flowing used oil must be handled according to the used oil management standards.
- Remove, repair, or replace the defective container immediately.
- Sprinkle lime at the leakage areas to control immediately.
- The contaminated soil having oil must be removed immediately and stored in the HW storage area and labeled properly as “Hazardous Waste - Oil Contaminated Soil” and follow all the procedures for the management of Hazardous Wastes as per regulations.
- Used oils may be stored in 200 lit drums/containers, not more than 90 days or 180 days as the case may be, with proper labeling.

The occupiers/generators may ensure that their used oil is transported only to registered hazardous waste recyclers who have obtained an authorization, using a hazardous waste manifest.

Appendix - D - Frequently Asked Questions (FAQs)

Frequently Asked Reporting Questions on Hazardous & Other Wastes Management

Do I need to report?

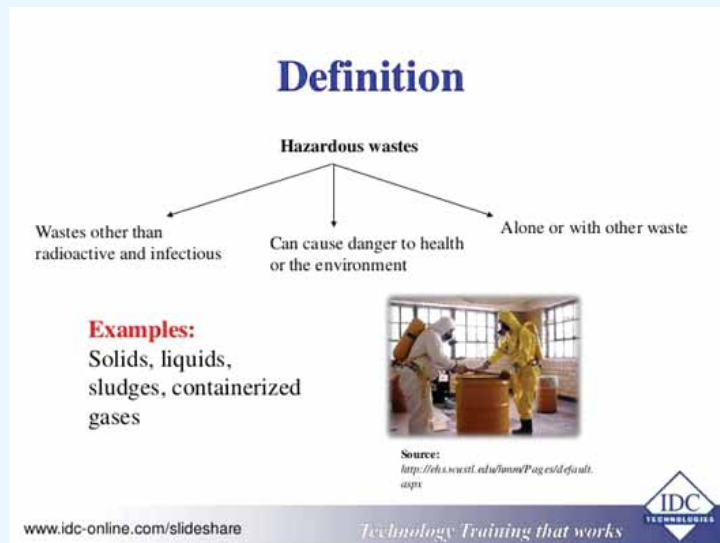
Most facilities/occupiers generating and/or managing hazardous waste need to report to the SPCBs/PCCs for obtaining authorization on Form 1 according to Rule 6 (1) for generation or collection or storage or transport or reception or recycling or reuse or recovery or pre-processing or co-processing or utilization or treatment or disposal of hazardous and other waste. SPCBs/PCCs are authorized as per the Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 to administer hazardous waste programs in the respective states. The following categories have reporting requirements:

- Hazardous Waste Generators/Occupiers are required to fill up Part A and Part B of Form 1 for authorization. You are also required to file Annual Returns on Form 4 as per Rule 6 (5), 13 (8), 16 (6) and 20 (21) of Rules by 30th day of September every year.
- Hazardous Waste Treatment, Storage or Disposal Facilities – This means that your facility has filed a Part A application or holds a Part C authorization for the treatment, storage or disposal of hazardous waste as required under HOWTM Rules, 2016. Treatment, storage and disposal facilities report their waste receipts using the Hazardous Waste Received Form. In addition, you are also required to file Annual Returns on Form 4 as per Rule 6 (5), 13 (8), 16 (6) and 20 (21) of Rules by 30th day of September every year.
- Designated Hazardous Waste Recycling Facilities – This means that your facility receives hazardous waste from off site and recycles. You are required to fill up Part D of Form 1. In addition, you are also required to file Annual Returns on Form 4 as per Rule 6 (5), 13 (8), 16 (6) and 20 (21) of Rules by 30th day of September every year. Recycling facilities report their waste receipts using the Hazardous Waste Received Form.

What is a hazardous waste?

“Hazardous waste” means any waste which by reason of characteristics such as physical, chemical, biological, reactive, toxic, flammable, explosive or corrosive, causes danger or is likely to cause danger to health or environment, whether alone or in contact with other waste or substances and shall include:

- i. Wastes specified in column (3) of Schedule-I;
- ii. Wastes having equal to or more than the concentration limits specified for the constituents in Class A and Class B of Schedule-II or any of the characteristics as specified in Class C of Schedule II; and
- iii. Wastes specified in Part-A of Schedule-III in respect of import or export of such wastes or the wastes not specified in Part A but exhibits hazardous characteristics specified in Part-C of Schedule-III



What is not hazardous waste?

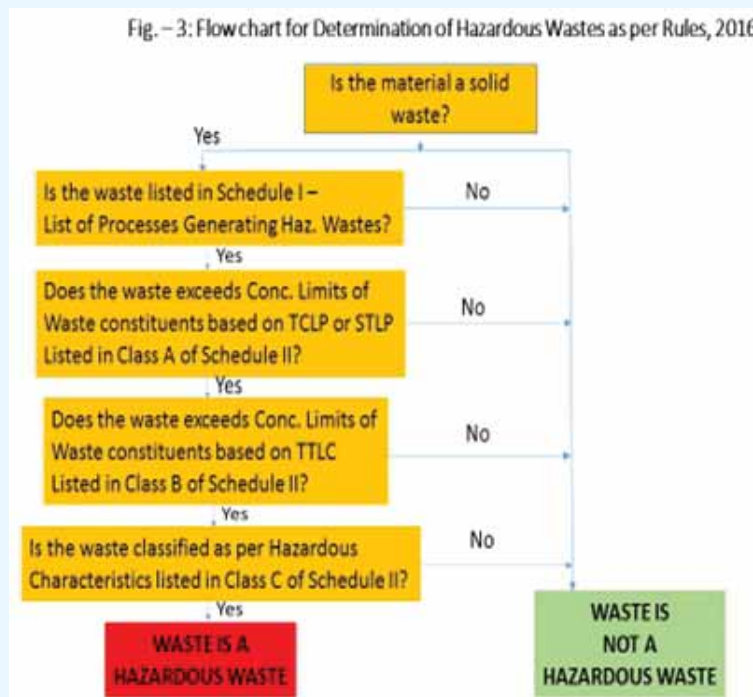
The rules are not applicable to the following and don't need to be reported as a hazardous waste:

- a. waste water and exhaust gases as covered under the provisions of the Water (Prevention and Control of Pollution) Act, 1974 (6 of 1974) and the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981) and the rules there under and as amended from time to time;
- b. wastes arising out of operations from ships beyond five (5) KM of the relevant baseline as covered under the provisions of the Merchant Shipping Act, 1958 (44 of 1958) and the rules thereunder and as amended from time to time;
- c. radio-active wastes as covered under the provisions of the Atomic Energy Act, 1962 (33 of 1962) and the rules made there under and as amended from time to time;
- d. bio-medical wastes covered under the Bio-Medical Wastes (Management and Handling) Rules, 1998 made under the Act and as amended from time to time; and
- e. wastes covered under the Municipal Solid Wastes (Management and Handling) Rules, 2000 made under the Act and as amended from time to time.

How do I identify my hazardous waste?

Waste generators generally have two options when identifying waste. They can apply "process knowledge" or information about the raw materials and processes generating the waste. Common sources of generator knowledge include: Facility processes diagrams or descriptions; Lists of ingredients of materials used in waste generating processes; Known or suspected byproducts of waste generating processes; MSDS; Testing data and/or other information ascertained from similar processes using the same ingredients/materials. Alternatively, generators may opt to conduct laboratory analysis on the waste, post-generation. Though such analysis provides a definitive basis for classification, it can be quite costly to perform.

The following chart will help you to identify your hazardous waste:



How much time period I can store my hazardous waste on-site?

The occupiers of facilities generating hazardous & other wastes may store for a period of not more than ninety (90) days and a maximum quantity of ten (10) tons. The State Pollution Control Board may extend the said period of ninety days in the following cases:

- Small generators (up to ten tons per annum) up to one hundred and eighty (180) days of their annual capacity;
- Actual users and disposal facility operators up to one hundred and eighty (180) days of their annual capacity;
- Occupiers who do not have access to any TSDf in the concerned State; or
- The waste which needs to be specifically stored for development of a process for its recycling, recovery, pre-processing, co-processing or utilization;

In any case on justification grounds up to one hundred and eighty (180) days;

How do I dispose of my Hazardous Wastes?

There are number of ways to deal with your hazardous wastes as below:

- You can have captive incinerator and secured landfill facility in case your waste generation is large. However, this is the least preferred option;
- You can sent to CHWTSDf facilities in your state/region. In case, there is no TSDf in your state

then you can find out nearest TSDf to your facility and can have an agreement and send your HW to that facility in another state with intimation to the SPCB of that state;

- c. In case, your waste has calorific value and need to be incinerated then you can have an option of co-processing your HW in cement industry under Rule 9;
- d. In case, you have commonly recyclable waste then you can send your HW to the authorized recyclers under Rule 9 as per Schedule – IV HW;
- e. In case, you have wastes which has other utilization then you can send your waste to authorized facilities under Rule 9.

When do I report my hazardous waste on the annual report?

Do report waste if:

It's managed on-site in an "open-loop" system and is accumulated or stored prior to recycling or treatment.

- It's spent material (e.g., spent solvent) that is accumulated or stored prior to being recycled on-site.
- It's disposed of or treated on-site.
- It's sent off-site for treatment, storage, disposal or recycling.
- It's a residue or sludge from a "closed-loop" recycling system (on-site only).
- It's a residue or sludge from an in-line continuous recycling system (on-site only).
- It's a pesticide residue that is not reused.
- It's managed in a wastewater treatment unit or elementary neutralization unit. See How do I report waste managed in wastewater treatment units or elementary neutralization units? for more details.
- It's waste imported from a foreign country.

Don't report waste if:

It's managed on-site in a "closed-loop" recycling system.

- It's managed on-site in an "in-line" continuous recycling system.
- It's spent material (e.g., spent solvent) that is immediately transferred from a process unit to an on-site recycling unit.
- It's reused as is, for a purpose in which it was intended.
- It's managed as a universal waste.

How do I identify individual waste streams?

Use your best judgment in identifying individual waste streams at your facility. Schedule I has

identified the processes and hazardous wastes in the operations. Total 38 processes have been identified with various types of hazardous waste. Use your best judgment in determining the source and type of waste category based on the type of process or activity from which a waste was generated.

Example: Wastes or residues containing oil comes under Waste Category No. 5.2.

How do I report waste with multiple management methods?

Many hazardous waste streams receive several types of management prior to final disposal. In most cases, only the final activity should be reported on the Waste Generation and Management form. Normally, the owner of the CHWTSDF identifies the management methods of hazardous waste and inform to the occupier/generator of waste, based on the detailed laboratory tests.

However, if the occupier is aware of the management method for the type of hazardous waste being generated, he can inform to the Owner of CHSTSDF.

If the residual from an on-site management activity is a hazardous waste, it should be reported as a separate waste stream.

Example: Spent solvent is generated from “Production and/or industrial use of solvents” need to be reported as Waste Category No. 20.2. Similarly, report the still bottoms as being managed off-site using the Waste Category No. 36.1 from “Purification process for organic compounds / solvents.”

How do I report wastes managed in wastewater treatment units?

Wastewater that is hazardous only because it exhibits the corrosivity characteristic and is transferred immediately (i.e., through an engineered conveyance device) into an elementary neutralization unit is not covered under HOWTM Rules, 2016. However, the residues and sludge generated from the treatment of wastewater and exhaust gases are covered under Waste Category No. 35.

Example: “Metal Surface Treatment and Production of Iron & steel” generate Spent acid and alkalis and Spent Pickling acid which are covered under Waste Category No. 12.2 and 13.1 respectively.

How do I report periodic or one-time waste generation?

Periodic or one-time waste generation means generation of waste from non-routine events, such as cleanup of spills or discarding of out-of-date products or chemicals. This includes remediation-derived waste generation, such as generation as a result of remedial action or closure of a hazardous waste management unit. Generation of these wastes, including investigation-derived waste, must be reported on the same Form 1.

What shall I do in case of accidental spillages?

You should have all the equipment required to deal with spillages in your premises. At the first place try to minimize the spillages in your facility. First of all, you should identify the area of spillage,

isolate and use lime to control the spillage. In case of spillage you should contact the experts/specialists after primary control and cordon off the area and do the remediation after assessing the damage.

Can I import hazardous & other wastes?

As per Rule 12 of HOWTM Rules, 2016 import of hazardous waste is not allowed for disposal however, it is permitted for recycle and recovery on actual user basis as per Rule 13 as specified in Part A & Part B of Schedule III.

How can I import hazardous & other wastes?

You must apply to the MOEF&CC in Form 5 along with the required documents as listed in the form along with prior information consent (PIC) from the exporting country in respect of Part A of Schedule III waste. You should also send a copy of the application simultaneously to respective SPCB for information.

Do I need to take permission of all types of wastes to be imported?

No. For the import of Other Wastes listed in Part D of Schedule III, the importer is not required to take permission from the MOEF&CC. However, the importer is required to furnish the required information as per Form 6 to the Customs authorities along with the following documents:

- Import license from DGFT, if applicable;
- The valid consents under the Water (Prevention and Control of Pollution) Act, 1974 (25 of 1974) and Air (Prevention and Control of Pollution) Act, 1981 (21 of 1981) and the authorization under these rules as well as authorization under the E-Waste (Management and Handling) Rules, 2011, as amended from time to time, whichever is applicable;

Are traders allowed to import hazardous & other wastes?

Though the import of hazardous and other wastes are allowed on actual user basis however, traders are allowed to import wastes on behalf of actual users as per sub-rule 2 (c) of Rule 13 of HOWTM Rules, 2016. In such cases, the traders are required to obtain one time authorization from the MOEF&CC on Form 7 along with the copy of Form 6.

Am I allowed to import used electrical and electronic goods?

For Part B of Schedule III, in case of import of any used electrical and electronic assemblies or spares or part or component or consumables as listed under Schedule I of E-Waste (Management and Handling) Rules, 2011, as amended from time to time, the importer need to obtain Extended Producers Responsibility (EPR)-authorization as producer under E-Waste (Management and Handling) Rules, 2011.

Where do I get additional help?

You can obtain information regarding CHWTSDf and authorized recyclers on CPCB and MOEF&CC websites.

FREQUENTLY ASKED QUESTIONS ON MANIFEST

What is a Hazardous Waste Manifest?

A Hazardous Waste Manifest is a shipping document that tracks hazardous waste from the point of generation to ultimate disposal. This system is commonly referred to as the "cradle to grave" system of hazardous waste management. See our forms page for a sample manifest and the instructions to fill out a manifest.

When do I need to use a manifest?

When hazardous waste is transported.

Where do I find the waste codes for the hazardous waste my company is generating?

The waste codes will vary and certain wastes will have more than one waste code. You should consult your laboratory for guidance on testing for determining waste codes. Also, your hazardous waste service provider can assist you identifying the correct hazardous waste code for your waste.

Is my transporter responsible for filling out my manifest properly?

No, the generator is responsible for the preparation, accuracy, and any corrections made to the manifest.

What manifest copies should I receive from my transporter and facility?

You are required to prepare seven copies of manifest to track your waste in Form 10 comprising of colour code as below and all the copies to be signed by sender:

Copy number with Colour code (1)	Purpose (2)
Copy 1 (White)	To be forwarded by the sender to the SPCB after signing all the seven copies
Copy 2 (Yellow)	To be retained by the sender after taking signature from the transporter and the rest of the five signed copies to be carried by the transporter
Copy 3 (Pink)	To be retained by the receiver (actual user or TSD operator) after receiving the waste and the remaining four copies are to be duly signed by the receiver.
Copy 4 (Orange)	To be handed over to the transporter by the receiver after accepting waste.
Copy 5 (Green)	To be sent by receiver to the SPCB
Copy 6 (Blue)	To be sent by receiver to the sender
Copy 7 (Grey)	To be sent by receiver to the SPCB of the sender in case the sender is in another state

Before your waste is shipped, you and your transporter must sign the manifest. Once the hazardous waste manifest is signed, you will receive one copy of the manifest.

Once your waste has been received at the destination facility you should receive an additional copy of your hazardous waste manifest. This manifest will have a facility signature in box 16 indicating that the waste has been received by the facility. You should retain this copy in your files for at least 3 years. In case the facility exists in another state than the state of origin of waste then receiver of the waste must send one copy of manifest to the SPCB of another state.



Figure - 1: Showing pathway of hazardous waste movement

What if I don't receive copies of my manifest from my transporter and/or facility within 30 days of the facility shipping the waste?

You should contact your transporter and/or facility immediately to obtain copies. If after contacting the transporter and facility, you are still unable to obtain a copy of the manifest then inform the SPCB with details of shipment.

What if I find that information contained in my manifest is incorrect?

If the waste has not yet been shipped, you may change any errors on the manifest and initial the corrections. However, if the waste has left your property, you must submit a discrepancy letter to the receiver of the waste with a copy to the SPCB.

What information needs to be included in a discrepancy letter?

You will need to include a copy of the manifest or on company letterhead a reference to the generator name, date of shipment, manifest number and the discrepancy.

How can I convert the volume of my waste into kilos/tons?

Use the converter tool to help convert the amount of waste into kilos/tons.

Do's and Don'ts of Hazardous Wastes

Do's

Generation & Storage:

- Do establish if waste is hazardous and if yes then is it listed under Schedule I or fall under Class A or Class B of Schedule II or has any of the characteristics as specified in Class C of Schedule II viz.; Ignitable, Corrosive, Reactive, Toxic or a listed waste.
- Do obtain authorization from your SPCB for handling and managing your hazardous & other wastes.
- Do minimize waste generation at source, if possible.
- Do buy only the amount you will need and use.
- Use up any leftover materials you have before buying new.
- Do segregate and recycle your waste, if possible.
- Do renew your authorization in time before it gets expired.
- DO label each waste container "Hazardous waste" and hazardous constituents.
- DO store waste in compatible containers with an unbroken screw-top lid.
- Do keep containers of waste closed except when waste is being added to them.
- DO segregate halogenated and non-halogenated solvents.
- DO store all chemical waste within secondary containment can be a lab tray or a dishpan. It just needs to hold the contents of the largest container in case of breakage or accident. Provide secondary containment for incompatible materials.
- DO keep container exteriors free from contamination. Wipe down container if necessary.
- Do segregate the non-compatible wastes and store them separately.
- Do store your HW in a designated area isolated from production & protected.
- Do provide proper signage.
- Do select the area suitable for waste storage on the basis of environmental sensitivity.
- Do inspect your storage area regularly and replace the leaking containers.
- Follow directions for proper use, storage, and disposal of hazardous chemicals as per MSDS.
- Participate in hazardous waste collections or take hazardous waste to a collection facility.
- Do send copy of manifest to SPCB after sending your waste to CTSD.
- Do submit annual returns to SPCB regularly on 30th day of September every year.

Transportation:

- Do use an authorized waste service provider only.
- Do ask for your waste collectors' waste carrier number.
- Do ask where your waste is being taken, check if the place exists.
- Do ask what is going to happen to your waste - is it being landfilled or reprocessed?
- Do remember to sign a manifest when your waste is first collected and retain a copy for at least 3 years.

Recycle & Reuse:

- Do search for authorized companies who will collect and recycle or reuse your waste.
- Do ask the copy of the passbook from the registered recycler.
- Check the validity of recycler.
- Do ensure that the recycler has proper facilities for recovery and disposal of residues.
- Do ensure that recycler has agreement with authorized TSDF for disposal of their residues in case, he does not have captive facility.
- Do think if a quoted price sounds too good to be true, it probably is.

Treatment and Disposal:

- Do provide preliminary or primary treatment to your waste before sending for final disposal, if required.
- Do send your wastes to the authorized TSDF facilities only.
- Do check the valid authorization from CTSDf.
- Do provide correct types & composition of your wastes to be disposed in CTSDf.
- Do ask how your waste will be disposed.
- Do check the facilities and capabilities available with CTSDf.
- Do collect copy of manifest from Owner of CTSDf within one month of sending your waste.

CTSDf:

- Do random check the incoming wastes about their characteristics.
- Do provide proper fencing and security to stop for any unauthorized entry to the facility.
- Do provide proper pre-treatment of waste before final disposal.
- Do maintain proper records with photographs for the disposal of wastes in CTSDf.
- Do send manifest copies to respective occupiers and SPCBs in time.

Don'ts

- Don't use a waste management company before you carry out your Duty of Care checks on them.
- Do not store your HW beyond the time limit allowed in your authorization.
- Do not store your waste in unlined surface.
- Do not send your recyclable waste to any unauthorized recyclers.
- Do not hand over your HW to any unauthorized person for disposal.
- Don't take your business waste to any of the Recycling facility which is not registered with CPCB/MOEF&CC.
- Don't put hazardous waste in a normal rubbish bin.
- Make sure hazardous waste is dealt with by someone with a specialist licensee.
- DO NOT pour chemicals or solvents down the drain.
- DO NOT evaporate chemical wastes in a fume hood.
- DO NOT abandon chemicals in the laboratory.
- DO NOT mix various waste chemicals indiscriminately,
- DO NOT throw chemicals into trash containers until you determine if waste is non-hazardous.
- DO NOT accumulate chemical wastes for any extended period of time. A chemical waste disposal form should be completed when a container is 95% full. A container not yet full should not be held for more than 6 months.
- DO NOT stockpile unused chemicals.
- DO NOT keep leaking or damaged containers.
- DO NOT mix products together.
- DO NOT remove wastes from their original container.
- DO NOT store spent solvents near heat or flames.

FORMS AS PER RULES, 2016

FORM 1

[See rule 6 (1)]

Application required for grant/renewal of authorisation for generation or collection or storage or transport or reception or recycling or reuse or recovery or pre-processing or co-processing or utilisation or treatment or disposal of hazardous and other waste

Part A: General (to be filled by all)

1. (a) Name and address of the unit and location of facility :
(b) Name of the occupier of the facility or operator of disposal facility with designation, Tel, Fax and e-mail:
(c) Authorisation required for (Please tick mark appropriate activity or activities:

- | | | |
|--------|----------------|--------------------------|
| (i) | Generation | <input type="checkbox"/> |
| (ii) | Collection | <input type="checkbox"/> |
| (iii) | Storage | <input type="checkbox"/> |
| (iv) | Transportation | <input type="checkbox"/> |
| (v) | Reception | <input type="checkbox"/> |
| (vi) | Reuse | <input type="checkbox"/> |
| (vii) | Recycling | <input type="checkbox"/> |
| (viii) | Recovery | <input type="checkbox"/> |
| (ix) | Pre-processing | <input type="checkbox"/> |
| (x) | Co-processing | <input type="checkbox"/> |
| (xi) | Utilisation | <input type="checkbox"/> |
| (xii) | Treatment | <input type="checkbox"/> |
| (xiii) | Disposal | <input type="checkbox"/> |
| (xiv) | Incineration | <input type="checkbox"/> |

- (d) In case of renewal of authorisation previous authorisation numbers and dates and provide copies of annual returns of last three years including the compliance reports with respect to

the conditions of Prior Environmental Clearance, wherever applicable:

2. (a) Nature and quantity of waste handled per annum (in metric tonne or kilo litre)
(b) Nature and quantity of waste stored at any time (in metric tonne or kilo litre)
3. (a) Year of commissioning and commencement of production:
(b) Whether the industry works:
 - (i) 01 Shift
 - (ii) 02 Shifts
 - (iii) Round the clock
4. Provide copy of the Emergency Response Plan (ERP) which should address procedures for dealing with emergency situations (viz. Spillage or release or fire) as specified in the guidelines of Central Pollution Control Board. Such ERP shall comprise the following, but not limited to:
 - Containing and controlling incidents so as to minimise the effects and to limit danger to the persons, environment and property;
 - Implementing the measures necessary to protect persons and the environment;
 - Description of the actions which should be taken to control the conditions at events and to limit their consequences, including a description of the safety equipment and resources available;
 - Arrangements for training staff in the duties which they are expected to perform;
 - Arrangements for informing concerned authorities and emergency services; and
 - Arrangements for providing assistance with off-site mitigatory action.
5. Provide undertaking or declaration to comply with all provisions including the scope of submitting bank guarantee in the event of spillage, leakage or fire while handling the hazardous and other waste.

Part B: To be filled by hazardous waste generators

1. (a) Products and by-products manufactured (names and product wise quantity per annum):
(b) Process description including process flow sheet indicating inputs and outputs (raw materials, chemicals, products, by-products, wastes, emissions, waste water etc.)
Please attach separate sheets:
(c) Characteristics (waste-wise) and Quantity of waste generation per annum:
(d) Mode of management of © above:
 - i. Capacity and mode of secured storage within the plant;

- ii. Utilisation within the plant (provide details);
 - iii. If not utilised within the plant, please provide details of what is done with this waste;
 - iv. Arrangement for transportation to actual users/ TSDf;
- (e) Details of the environmental safeguards and environmental facilities provided for safe handling of all the wastes at point © above;
2. Hazardous and other wastes generated as per these rules from storage of hazardous chemicals as defined under the Manufacture, Storage and Import of Hazardous Chemicals Rules, 1989

Part C: To be filled by Treatment, storage and disposal facility operators

1. Provide details of the facility including:
- (i) Location of site with layout map;
 - (ii) Safe storage of the waste and storage capacity;
 - (iii) The treatment processes and their capacities;
 - (iv) Secured landfills;
 - (v) Incineration, if any;
 - (vi) Leachate collection and treatment system;
 - (vii) Fire fighting systems;
 - (viii) Environmental management plan including monitoring; and
 - (ix) Arrangement for transportation of waste from generators.
2. Provide details of any other activities undertaken at the Treatment, storage and disposal facility site.
3. Attach a copy of prior Environmental Clearance.

Part D: To be filled by recyclers or pre-processors or co-processors or users of hazardous or other wastes

1. Nature and quantity of different wastes received per annum from domestic sources or imported or both:
2. Installed capacity as per registration issued by the District Industries Centre or any other authorised Government agency. Provide copy:

3. Provide details of secured storage of wastes including the storage capacity:
4. Process description including process flow sheet indicating equipment details, inputs and outputs (input wastes, chemicals, products, by-products, waste generated, emissions, waste water, etc.). Attach separate sheets:
5. Provide details of end users of products or by-products:
6. Provide details of pollution control systems such as Effluent Treatment Plant, scrubbers, etc. including mode of disposal of waste:
7. Provide details of occupational health and safety measures:
8. Has the facility been set up as per Central Pollution Control Board guidelines? If yes, provide a report on the compliance with the guidelines:
9. Arrangements for transportation of waste to the facility:

Signature of the Applicant

Designation

Date.....

Place.....

FORM 2

[See rule 6(2)]

FORM FOR GRANT OR RENEWAL OF AUTHORISATION BY STATE POLLUTION CONTROL BOARD TO THE OCCUPIERS, RECYCLERS, REPROCESSORS, REUSERS, USER AND OPERATORS OF DISPOSAL FACILITIES

1. Number of authorisation and date of issue :
2. Reference of application (No. and date) :
3.ofis hereby granted an authorisation based on the enclosed signed inspection report for generation, collection, reception, storage, transport, reuse, recycling, recovery, pre-processing, co-processing, utilisation, treatment, disposal or any other use of hazardous or other wastes or both on the premises situated at.....

Details of Authorisation

Sl. No.	Category of Hazardous Waste as per the Schedules I, II and III of these rules	Authorised mode of disposal or recycling or utilisation or co-processing, etc.	Quantity (ton/annum)

- (1) The authorisation shall be valid for a period of
- (2) The authorisation is subject to the following general and specific conditions (Please specify any conditions that need to be imposed over and above general conditions, if any):

A. General conditions of authorisation:

1. The authorised person shall comply with the provisions of the Environment (Protection) Act, 1986, and the rules made there under.
2. The authorisation or its renewal shall be produced for inspection at the request of an officer authorised by the State Pollution Control Board.
3. The person authorised shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorisation.
4. Any unauthorised change in personnel, equipment or working conditions as mentioned in the application by the person authorised shall constitute a breach of his authorisation.

5. The person authorised shall implement Emergency Response Procedure (ERP) for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
6. The person authorised shall comply with the provisions outlined in the Central Pollution Control Board guidelines on “Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty”
7. It is the duty of the authorised person to take prior permission of the State Pollution Control Board to close down the facility.
8. The imported hazardous and other wastes shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
9. The record of consumption and fate of the imported hazardous and other wastes shall be maintained.
10. The hazardous and other waste which gets generated during recycling or reuse or recovery or pre-processing or utilisation of imported hazardous or other wastes shall be treated and disposed of as per specific conditions of authorisation.
11. The importer or exporter shall bear the cost of import or export and mitigation of damages if any.
12. An application for the renewal of an authorisation shall be made as laid down under these Rules.
13. Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
14. Annual return shall be filed by June 30th for the period ensuring 31st March of the year.

B. Specific conditions:

Date:

Signature of Issuing Authority

Designation and Seal

FORM 3

[See rules 6(5), 13(7), 14(6), 16(5) and 20 (1)]

FORMAT FOR MAINTAINING RECORDS OF HAZARDOUS AND OTHER WASTES

1. Name and address of the facility :
2. Date of issuance of authorisation and its reference number :
3. Description of hazardous and other wastes handled (Generated or Received)

Date	Type of waste with category as per Schedules I, II and III of these rules	Total quantity (Metric Tonnes)	Method of Storage	Destined to or received from

** Fill up above table separately for indigenous and imported waste.*

4. Date wise description of management of hazardous and other wastes including products sent and to whom in case of recyclers or pre-processor or utiliser:
5. Date of environmental monitoring (as per authorisation or guidelines of Central Pollution Control Board):

Signature of occupier

Date.....

Place.....

FORM 4

[See rules 6(5), 13(8), 16(6) and 20 (2)]

FORM FOR FILING ANNUAL RETURNS

[To be submitted to State Pollution Control Board by 30th day of June of every year for the preceding period April to March]

1. Name and address of facility:
2. Authorisation No. and Date of issue:
3. Name of the authorised person and full address with telephone, fax number and e-mail:
4. Production during the year (product wise), wherever applicable

Part A. To be filled by hazardous waste generators

1. Total quantity of waste generated category wise
2. Quantity dispatched
 - (i) to disposal facility
 - (ii) to recycler or co-processors or pre-processor
 - (iii) others
3. Quantity utilised in-house, if any -
4. Quantity in storage at the end of the year –

Part B. To be filled by Treatment, storage and disposal facility operators

1. Total quantity received -
2. Quantity in stock at the beginning of the year -
3. Quantity treated –
4. Quantity disposed in landfills as such and after treatment –
5. Quantity incinerated (if applicable) -
6. Quantity processed other than specified above -
7. Quantity in storage at the end of the year -

Part C. To be filled by recyclers or co-processors or other users

1. Quantity of waste received during the year –
(i) domestic sources
(ii) imported (if applicable)
2. Quantity in stock at the beginning of the year –
3. Quantity recycled or co-processed or used –
4. Quantity of products dispatched (wherever applicable) –
5. Quantity of waste generated -
6. Quantity of waste disposed -
7. Quantity re-exported (wherever applicable)-
8. Quantity in storage at the end of the year -

**Signature of the Occupier or
Operator of the disposal facility**

Date.....

Place.....

FORM 5

[See rules 13 (1) and 14 (1)]

**APPLICATION FOR IMPORT OR EXPORT OF HAZARDOUS AND OTHER WASTE FOR REUSE
OR RECYCLING OR RECOVERY OR CO-PROCESSING OR UTILISATION**

TO BE FILLED IN BY APPLICANT

S. No.	Description	Details to be furnished by the importer or exporter
(1)	(2)	(3)
1	Importer or Exporter (name and address) in India Contact person Tel, fax and e-mail Facility location/address Reason for import or export	
2	Importer or exporter (name and address) outside of India	
3	Details of waste to be imported or exported (a) Quantity (b) Basel No. (c) Single/multiple movement (d) Chemical composition of waste (attach details), where applicable (e) Physical characteristics (f) Special handling requirements, if applicable	
4	(a) Quantity (b) Basel No. (c) Single/multiple movement (d) Chemical composition of waste (attach details), where applicable (e) Physical characteristics (f) Special handling requirements, if applicable	

5	<p>For importer (a) Process details along with environmental safeguard measures (attach separate sheet) (b) Capacity of recycling or co-processing or recovery or utilization</p> <p>Enclose a copy each of valid authorisation and valid consent to operate from SPCB</p>	
6	Details of import against the Ministry of Environment,	

9. Undertaking:

I hereby solemnly undertake that:

- (i) The information is complete and correct to the best of my knowledge and legally-enforceable written contractual obligations have been entered into and that my applicable insurance or other financial guarantees are or shall be in force covering the transboundary movement.
- (ii) The waste permitted shall be fully insured for transit as well as for any accidental occurrence and its clean-up operation.
- (iii) The record of consumption and fate of the imported waste shall be recorded and report sent to the SPCB every quarter.
- (iv) The hazardous or other waste which gets generated in our premises by the use of imported hazardous or other wastes in the form of raw material shall be treated and disposed of as per conditions of authorisation.
- (v) I agree to bear the cost of export and mitigation of damages if any.
- (vi) I am aware that there are significant penalties for submitting a false certificate/ undertaking/ disobedience of the rules and lawful orders including the possibility of fine and imprisonment.
- (vii) The exported wastes shall be taken back, if it is not acceptable to the importer.

Signature of the Applicant
Designation

Date.....

Place.....

FORM – 6

[See rules 13(2), 13 (10) and 14 (5)]

TRANSBOUNDARY MOVEMENT- MOVEMENT DOCUMENT

S. No.	Description	Details to be furnished by the exporter or importer
1	2	3
1	Exporter (Name and Address) Contact Person Tele, Fax and email	: : : :
2	Generator(s) of the waste (Name and Address) ₁ Contact Person Tele, Fax and email Site of generation	: : : :
3	Importer or Actual user (Name and Address) Contact person Tele, Fax and email	: : : :
4	Trader (Name and Address) Contact person Tele, Fax and email Details of actual user (Name, Address, Telephone and email)	: : : :
5	Corresponding to applicant Ref. No., If any	:
6	Bill of lading (attach copy)	:
7	Country of import/export	:
8	General description of waste (a) Quantity (b) Physical characteristics (c) Chemical composition of waste (attach details), where applicable (d) Basel No. (e) UN Shipping name (f) UN Class (g) UN No (h) H Number (i) Y Number (j) ITC (HS) (k) Customs Code (H.S.) (l) Other (specify)	:
9	Type of packages	:
9	Number	:
10	Special handling requirements including emergency provision in case of accidents	:
11	Movement subject to single/multiple consignment	:
11	In case of multiple movement-	:

12	Transporter of waste (Name and Address) ¹ Contact Person Tele, Fax and email	:	
	Registration number	:	
	Means of transport (road, rail, inland waterway, sea, air) ²	:	
	Date of Transfer	:	
	Signature of Carrier's representative	:	
13	<small>Exporter's declaration</small> waste:		
	I certify that the information in Sl. Nos. 1 to 12 above are complete and correct to my best knowledge. I also certify that legally-enforceable written contractual obligations have been entered into and are in force covering the transboundary movement regulations/rules. Date:.....Signature:..... Name:.....		
TO BE COMPLETED BY IMPORTER (ACTUAL USER OR TRADER)			
14	Shipment received by importer/ actual user/trader ^{2 / 3}		
	Quantity received.....Kg/litres Date: <small>Name: Signature:.....</small>		
15	Methods of recovery		
	R code*		
	Technology employed (Attached details if necessary)		
16	I certify that nothing other than declared goods covered as per these rules is intended to be imported in the above referred consignment and will be recycled /utilized. Signature: Date:		
17	SPECIFIC CONDITIONS ON CONSENTING TO THE MOVEMENT if applicable.		(attach details)
Notes:- (1) Attach list, if more than one; (2) Select appropriate option; (3) Immediately contact competent authority in case of any emergency; (4) If more than one transporter carriers, attach information as required in SL. No. 12.			

List of abbreviations used in the Movement Document

Recovery Operations (*)

R1 Use as a fuel (other than in direct incineration) or other means to generate energy.

R2 Solvent reclamation/regeneration.

- R3 Recycling/reclamation of organic substances which are not used as solvents.
- R4 Recycling/reclamation of metals and metal compounds.
- R5 Recycling/reclamation of other inorganic materials.
- R6 Regeneration of acids or bases.
- R7 Recovery of components used for pollution abatement.
- R8 Recovery of components from catalysts.
- R9 Used oil re-refining or other reuses of previously used oil.
- R10 Land treatment resulting in benefit to agriculture or ecological improvement
- R11 Uses of residual materials obtained from any of the operations numbered R 1 to R 10

Date:

Signature.....

Place:

Designation.....

FORM 7

[See rule 13 (2) ©]

APPLICATION FORM FOR ONE TIME AUTHORISATION OF TRADERS FOR PART- D OF SCHEDULE III, WASTE

[To be submitted by trader to the State Pollution Control Board]

1	Name and address of trader with Telephone, Fax Number and e-mail	:	
2	TIN/VAT Number/Import/ Export Code	:	
3	Description and quantity of other waste to be imported	:	
4	Details of storage, if any	:	
5	Names and address of authorised actual user (s)	:	

Signature of the authorised person

Date:

Place:

FORM 8

[See rules 17 (1) and 18 (2)]

LABELLING OF CONTAINERS OF HAZARDOUS AND OTHER WASTE

Handle with care

Waste category and characteristics as per Part C of Schedules II and III of these rules	Incompatible wastes and substances
Total quantity	Date of storage
Physical State of the waste (Solid/Semi-solid/liquid):	
Sender's name and address	Receiver's name and address
Phone.....	Phone.....
E-mail.....	E-mail.....
Tel. and Fax No.....	Tel. and Fax No.....
Contact person.....	Contact person.....
In case of emergency please Contact	

Note:

1. Background colour of label - fluorescent yellow.
2. The word, 'HAZARDOUS WASTES' and 'HANDLE WITH CARE' to be prominent and written in red, in Hindi, English and in vernacular language.
3. The word 'OTHER WASTES' to be written prominently in orange, in Hindi, English and in vernacular language.
4. Label should be of non-washable material and weather proof.

FORM 9

[See rule 18 (2)]

TRANSPORT EMERGENCY (TREM) CARD

[To be carried by the transporter during transportation of hazardous and other wastes,
provided by the sender of waste]

1. Characteristics of hazardous and other wastes

S. No.	Type of waste	Physical properties/	Chemical constituents	Exposure hazards	First Aid requirements

:

2. Procedure to be followed in case of fire :
3. Procedure to be followed in case of spillage/accident/explosion :
4. For expert services, please contact :
 - (i) Name and Address :
 - (ii) Telephone No. :

(Name, contact number and signature of sender)

Date:

Place:

FORM 10

[(See Rule 19 (1))]

MANIFEST FOR HAZARDOUS AND OTHER WASTE

1	Sender's name and mailing address (including Phone No. and e-mail) :	
2	Sender's authorisationNo. :	
3	Manifest Document No. :	
4	Transporter's name and address: (including Phone No. and e-mail)	
5	Type of vehicle :	(Truck/Tanker/Special Vehicle)
6	Transporter's registration No. :	
7	Vehicle registration No. :	
8	Receiver's name and mailing address (including Phone No. and e-mail) :	
9	Receiver's authorisationNo. :	
10	Waste description :	
11	Total quantity : No. of Containers :m ³ or MTNos.
12	Physical form :	(Solid/Semi-Solid/Sludge/Oily/Tarry/Slurry/Liquid)
13	Sender's Certificate	I hereby declare that the contents of the consignment are fully and accurately described above by proper shipping name and are categorised, packed, marked, and labelled, and are in all respects in proper conditions for transport by road according to applicable national government regulations.
14	Name and stamp: Signature:	Month Day Year
15	Transporter acknowledgement of receipt of Wastes	
	Name and stamp: Signature:	Month Day Year
16	Receiver's certification for receipt of hazardous and other waste	
	Name and stamp: Signature:	Month Day Year

FORM 11

[See rule 22]

FORMAT FOR REPORTING ACCIDENT

[To be submitted by the facility or sender or receiver or transporter to the State Pollution Control Board]

1. The date and time of the accident :
2. Sequence of events leading to accident :
3. Details of hazardous and other wastes involved in accident :
4. The date for assessing the effects of the accident on health or the environment :
5. The emergency measures taken :
6. The steps taken to alleviate the effects of accidents :
7. The steps take to prevent the recurrence of such an accident :

Date:

Signature:

Place:

Designation:

FORM 12
[See rule 24 (1)]
APPLICATION FOR FILING APPEAL
AGAINST THE ORDER PASSED BY STATE POLLUTION CONTROL BOARD

1. Name and address of the person making the appeal :
2. Number, date of order and address of the authority : (certified copy of which passed the order, against which appeal is being the order be attached) made
3. Ground on which the appeal is being made :
4. Relief sought for :
5. List of enclosures other than the order referred in point 2 against which the appeal is being filed. :

Signature.....

Name and address.....

Date:

Contribution by:

Dr. A. K. Saxena (Former NPC Director, Specialist in Hazardous Waste Management)

Central Pollution Control Board (CPCB) Team

Shri B. Vinod Babu, Scientist-E & Nodal Officer (Waste Management)

National Productivity Council (NPC) Team

Shri K. D. Bhardwaj, Regional Director, Delhi, Shri D. Sreenivasulu, Deputy Director, Dr. Shukla Pal Maitra, Deputy Director, Ms. Nikita, Assistant Director and Ms. Preeti P., Assistant Director



NATIONAL PRODUCTIVITY COUNCIL

NPC is a national level organization to promote productivity culture in India. Established as a registered society in 1958 by Government of India, it is an autonomous, tripartite, not for profit organization with equal representation from the Government, Employers and Employees' organizations, apart from technical & professional institution on its governing council. Besides providing training, consultancy and undertaking research in the area of productivity, NPC also implements the productivity promotion plans and programmes of the Tokyo based Asian Productivity Organization (APO), an inter-governmental body of which the Government of India is a founder member.

MISSION of NPC is Development, Dissemination and Application of knowledge and experience in productivity, for promoting consciousness and improvement in productivity, with the objective of strengthening the performance and competitiveness of the economy as well as of improving the working conditions and quality of working life.

The Union Minister for Industry is the President of NPC, and the Secretary (Industrial Development) is its Chairman. Director General is the Chief Executive Officer, and is a government appointee. NPC has 13 Regional Directorates in the country with its Head Quarters at New Delhi and strength of over 170 full time consultants.

CORE COMPETENCIES:

NPC offers TOTAL SOLUTIONS, as also specific services in management as well as technological areas. These include:

- › **Industrial Engineering:** Workload assessment, Organization Redesign, Systems & Procedures redesign, Material requirement planning, MIS, Project Management, Cost reduction. Total Quality Management, ISO 9000, Certification, Business Process engineering, KAIZEN, Benchmarking etc.
 - › **Human Resource Development:** Work culture, Participative group activities, Productivity Linked reward Scheme, Training needs assessment, Wage structure, Competency Matrix.
 - › **Information Technology:** Management Information system, E – Governance, IT Infrastructure Planning.
 - › **Energy Management:** Energy Audits, Co-generation, Demand side management, Renewable & Green energy sources, Process Optimization & energy Conservation.
 - › **Environment Management:** Integrated environment planning, Environmental Audit, Cleaner Production Techniques, Hazardous Waste Management, Waste Minimization & Utilization, Green Productivity, ISO 14000 & OHSAS 18000.
 - › **Productivity Implementation:** Policy Research & Techno-economic Consultancy, Productivity Audit.
 - › **Technology Management:** Condition Monitoring, Safety audit, Risk assessment, Total Productive Maintenance.
 - › **World Class Manufacturing:** Flexible/ cellular manufacturing, JIT, Cycle time reduction, Six Sigma.
 - › **Agribusiness:** Food Processing, Warehousing Logistics, Evaluation Studies, Soil & Water conservation.
- NPC brings out literature suitable to Indian situation on current and emerging subjects relating to productivity and quality. It also brings out following periodicals, PRODUCTIVITY, PRODUCTIVITY NEWS AND UTPADAKTA (Hindi).

Visit us on: <http://www.npcindia.gov.in>



National Productivity Council

5-6, Institutional Area, Lodhi Road

New Delhi - 110003

www.npcindia.gov.in