Chapter 1

INTRODUCTION

The Hazardous Wastes (Management & Handling) Rules, 1989, as amended, requires that the State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC) shall grant authorization to the operator of a facility based on technical capability of the proponent. In order to facilitate implementation of the Rules, the Ministry of Environment and Forests (MoEF) and the Central Pollution Control Board (CPCB) have published several documents. These are:

1. Guidelines for management of hazardous waste (MoEF, 1992)
2. Guidelines for setting up of operating facility: Hazardous waste management (CPCB document: HAZWAMS/11/1998-99)
3. Ready Reckoner: Hazardous waste management (HAZWAMS/12/ 1998-99)
4. Criteria for hazardous wastes landfills, HAZWAMS/17/2000-01
5. Manual for design, construction and quality control of liners and covers for hazardous waste landfills, HAZWAMS/20/2002-03

The States of Andhra Pradesh, Maharashtra and Gujarat have promoted development of common facility in the private sector, for management of hazardous wastes in an environmentally sound and techno-economically viable manner. The services of treatment, storage and disposal facility (TSDF) are particularly useful for the hazardous waste generating units not only in the large category of industries but also for small & medium enterprises (SMEs), who on their own may not afford and are unable to provide on-site facility for proper disposal of hazardous wastes.

It is expected that more TSDFs would come up in the future to cater to the need for management of hazardous wastes in other States/UTs. These TSDFs are required to comply with the provisions under the Hazardous Waste (Management & Handling) Rules [HW(M&H)] and guidelines issued by MoEF and CPCB from time to time. It is, therefore, necessary to bring about certain guidelines for facilitate the regulatory compliance by the TSDF operators.

The guidelines aim at establishing the standards, which define the requirements for management of hazardous wastes (HW) at TSDF operating in the State. These guidelines shall apply to the generators of HW and the operators of the TSDF facilities.

Following aspects have been illustrated in this document:

- Definition of hazardous wastes for TSDF
- Methodology for classification, identification and characterization of hazardous wastes
- Operating procedures for TSDF
- Requirements for handling, collection and transportation of hazardous wastes
- Applicable standards for compliance of regulations
- Additional information on regulatory requirements for managing hazardous wastes

Chapter 2

IDENTIFICATION/CHARACTERIZATION OF HAZARDOUS WASTES

2.1 Regulatory definition of hazardous wastes as given in the Hazardous Wastes (Management & Handling) Rules, 1989, and further amendments made there under, is reproduced below:

Hazardous Wastes

Hazardous wastes *(HW)* have been defined to include:

a) Wastes, which are generated in the process, indicated in Column-2 of Schedule - 1, and consist of wholly or partly of the waste substances, referred to in Column-3 of the same schedule

b) Wastes, which consist wholly or partly of substances indicated in Schedule-2 if the concentration of the substances is equal to or more than the limit indicated in the same schedule, and

c) Wastes indicated in Lists A and B of Schedule-3 (Part-A) applicable only in case(s) of import or export of hazardous wastes in accordance with Rules 12, 13 and 14 if they possess any of the hazardous characteristics listed in Part (B) of the Schedule.

Explanation: For the purpose of the clause: i) all wastes mentioned in column (3) of Schedule 1 are hazardous wastes irrespective of concentration limits given in Schedule 2 except as otherwise indicated and Schedule 2 shall be applicable only for wastes or waste constituents not covered under column (3) of Schedule 1. ii). Schedule 3 shall be applicable only in case(s) of import or export.

2.2 Definition of hazardous wastes – its applicability

From the viewpoint of application of the HW (M&H) Rules, waste can be classified as hazardous if:

Waste substance is solid, semi-solid or non-aqueous liquid which because of its quantity, concentration or characteristics in terms of physical, chemical, infectious quality:

(a) can cause or significantly contribute to an increase in mortality or an increase in serious irreversible or incapacitate reversible illness, or

(b) pose a substantial present or potential hazard to human health or the environment when it is improperly treated, stored, transported, disposed of or otherwise managed

Thus, a waste is hazardous if it exhibits whether alone or when in contact with other wastes or substances, any of the characteristics identified below:

- Corrosivity
- Reactivity
- Ignitability
- Toxicity
- Acute toxicity
- Infectious property

2.3 Characteristics of Hazardous Waste

2.3.1 Corrosivity

A waste exhibits the characteristics of corrosivity if a representative sample of the waste has either of the following properties:

(a) any liquid which has a pH less than or equal to 2 or greater than or equal to 12.5 as determined by the standard test procedure; or

(b) a waste, which can corrode steel at a rate greater than 6.35 mm per year at a test temperature of 55 °C as determined by the standard test procedure.

2.3.2 Reactivity

A waste exhibits the characteristics of reactivity if a representative sample of the waste has any of the following properties:

(a) It is normally unstable and readily undergoes violent change without detonating

(b) It reacts violently with water

(c) It forms potentially explosive mixture with water

(d) It is Cyanide or Sulfide 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 pose danger to human health or the environment.

(e) It is an explosive.

2.3.3 Ignitability

A waste exhibits the characteristics of ignitability if a representative sample of the waste has any of the following properties:

(a) It is a liquid other than an aqueous solution containing less than 24% organic solvents by volume and has flash point less than 60 °C as determined by a Pensky Martins closed cup tester using the standard test method.

(b) 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 so vigorously and persistently that it creates a hazard.

(c) any oxidizing substance, when in contact with moisture or other materials/wastes, results in spontaneous fire or combustion.

2.3.4 Toxicity

A solid waste exhibits the characteristics of toxicity if the leachate from the representative sample by Toxicity Characteristics Leaching Procedure (TCLP) test method (as followed by USEPA, vide No: S.W 846, till Indian standards are notified by MoEF / CPCB) contains any of the contaminants listed in Table 2.1 below in excess of the concentration limits mentioned thereupon.

Table 2.1 TCLP Test Limits*

S. No.	Contaminant	TCLP Limit (mg/l)
01.	Arsenic	5.0
02.	Barium	100
03.	Benzene	0.5
04.	Cadmium	1.0
05.	Carbontetrachloride	0.5
06.	Chlordane	0.03
07.	Chlorobenzene	100.0
08.	Chloroform	6.0
09.	Chromium	5.0
10.	o-Cresol	200.0

S. No.	Contaminant	TCLP Limit (mg/l)
11.	m-Cresol	200.0
12.	p-Cresol	200.0
13.	Cresol	200,0
14.	2,4-D	10.0
15.	1,4-Dichlorobenzene	7.5
16.	1,2-Dichloroethane	0.5
17.	1,1-Dichloroethylene	0.7
18.	2,4-Dinitrotoluene	0.13
19.	Endrin	0.02
20.	Heptachlor (and its epaoxide)	0.008
21.	Hexachlorobenzene	0.13
22.	Hexachlorobutadiene	0.5
23.	Hexachloroethane	3.0
24.	Lead	5.0
25.	Lindane	0.4
26.	Mercury	0.2
27.	Methoxychlor	10.0
28.	Methyl ethyl ketone	200.0
29.	Nitrobenzene	2.0
30.	Pentachlorophenol	100.0
31.	Pyridine	5.0
32.	Selenium	1.0
33.	Silver	5.0
34.	Tetrachloroethylene	0.7
35.	Toxaphene	0.5
36.	Trichloroethylene	0.5

S. No.	Contaminant	TCLP Limit (mg/l)
37.	2,4,5-Trichlorophenol	400.0
38.	2,4,6-Trichlorophenol	2.0
39.	2,4,5-TP (Silvex)	1.0
40.	Vinyl Chloride	0.2

*Note:

1 *These limits shall be applicable till the notification of leachate standards (including test method) under the E (P) Act, 1986*
2. *Best Demonstrated Available Technology (BDAT) standards shall be employed for parameters not mentioned.*
3. *Leachate collected shall be treated and disposed as liquid effluent in compliance of the standards notified under the E (P) Act, 1986.*

2.3.5. Acute toxicity

A waste exhibits the characteristics of being acutely hazardous if a representative sample contains any of the following:

(a) wastes generated in the manufacturing process of halogenated phenols and other halogenated compounds

(b) wastes generated in the manufacturing/formulating process of pesticides or pesticide derivatives

(c) wastes generated during the manufacturing process of halogenated benzene under alkaline conditions

(d) off-specification or discarded products generated from the above processes, and

(e) containers used for handling hazardous / toxic substances / wastes

2.3.6 Infectious property

Wastes containing viable micro-organisms or their toxins which are known or suspected to cause disease in animal or humans fall under this category.