BEFORE THE NATIONAL GREEN TRIBUNAL,

PRINCIPAL BENCH, NEW DELHI

ORIGINAL APPLICATION NO. 804/2017

(Earlier O.A No. 36/2012)

IN THE MATTER OF:-

RAJIV NARAYAN & ANR. **APPLICANT**

VS.

UOI & ORS. **RESPONDENTS**

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3.	**ANNEXURE-B** HON'BLE NGT ORDER DATED 12.04.2019	

BHARAT K. SHARMA
SCIENTIST-E
CENTRAL POLLUTION CONTROL BOARD,
PARIVESH BHAWAN, EAST ARJUN NAGAR,
DELHI-110032.

DATE: 10.05.2019
PLACE: DELHI

Compliance Report in the matter of OA No. 804 of 2017 (Earlier OA No.36/2012) titled Rajiv Narayan & Anr. Vs Union of India & Ors. in compliance of Hon'ble National Green Tribunal Order dated 12.04.2019

(1) The Hon'ble National Green Tribunal. Principal Bench, New Delhi, vide orders dated 12.04.2019 in the matter of O.A. No. 804/2017 (Earlier O.A. No. 36/2012) with M.A. No. 1302/2018 in Interlocutory Application No. 63 in W.P. (C) No. 657/1995; Rajiv Narayan & Anr Versus Union of India & Ors. with The Research Foundation for Science, Technology And Natural Resource Policy Versus Union of India & Ors. passed the following orders:

"… 9. CPCB may determine the scale of compensation to be recovered for violation of the Rules within one month from today and furnish a report to this Tribunal by e-mail at ngt.filing@gmail.com..."

(2) In compliance with above orders of the Hon'ble Tribunal, "Determination of Environmental Compensation to be recovered for violation of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016", has been prepared by CPCB and is given at Annexure **A**.

(3) The above document given at Annexure **A** is submitted herewith to the Hon'ble Tribunal in compliance of aforesaid order of the Hon'ble Tribunal, as at paras 1 above, for passing appropriate orders.

Determination of Environmental Compensation to be recovered for violation of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

May 2019

Central Pollution Control Board

(Ministry of Environment, Forest & Climate Change, Government of India)

Parivesh Bhawan, East Arjun Nagar,

Shahdara, Delhi – 110032

Contents

1. Background

Hazardous wastes are wastes 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. Such wastes are generated from most of the industries engaged in manufacturing process and require to be managed without having impact on human health and environment.

The Govt. of India has notified Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, as amended thereof, (herein after called as HOWM Rules, 2016) for the safe and environmentally sound management of hazardous wastes. The Rules lay down provisions for storage, packaging, transportation, recycling, utilization, pre-processing, co-processing, treatment, import, export, offering for sale, transfer or disposal, etc. of the hazardous and other wastes ("other wastes" has been defined under the said Rules).

In the matter of Original Application No. 804/2017 (Earlier O.A. No. 36/2012) With M.A. No. 1302/2018 in Interlocutory Application No. 63 in W. P. (C) No. 657/199; Rajiv Narayan & Anr Versus Union of India & Ors. With The Research Foundation for Science, Technology And Natural Resource Policy Versus Union of India & Ors., the Hon'ble National Green Tribunal, Principal Bench, New Delhi directed CPCB, vide orders dated 12/4/2019, to determine within one month the scale of compensation to be recovered for violation of the Rules. These guidelines have been prepared in compliance of the same and include methodology for calculating financial penalty and compensation for various violations of provisions of the HOWM Rules, 2016, in cases of the facilities requiring authorisation under the said Rules, 2016.

2. Salient features of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 pertaining to occupiers

The occupier of any factory or premises as defined under Rule 3(1)(21) of the Rules*, 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."*

The salient features of the HOWM Rules, 2016, applicable to the occupiers are as follow:

A. Responsibilities of the occupier

Responsibility for safe and environmentally sound management of hazardous and other wastes remains with occupier as per Rule 4 of the HOWM Rules, 2016.

The Rule also stipulates waste management hierarchy that an occupier is required to follow i.e. prevention, minimization, reuse, recycling, recovery, utilisation including co-processing as preferential steps over disposal of hazardous and other waste. Sending/ selling/ transportation/ recycling/ disposing of the hazardous wastes shall be in accordance with the provisions laid down under the Rules. Further, occupier shall take all the steps while managing hazardous and other wastes to contain contaminants and prevent accidents and limit their consequences on human beings and the environment and provide persons working in the site with appropriate training, equipment and the information necessary to ensure their safety.

B. Requirement of authorization

Handling, generation, storage, packaging, transportation, use, treatment, processing, recycling, recovery, pre-processing, co-processing, utilisation, offering for sale, transfer or disposal of the hazardous and other wastes are to be carried out by every occupier (requiring Consent to Establish or Consent to Operate under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981) after obtaining authorization from the concerned SPCB/PCC. Further, the SPCBs/PCCs are required to grant the same after such enquiry as it considers necessary, and on being satisfied that the applicant possesses appropriate facilities as stipulated under Rule 6.

C. Storage of hazardous or other wastes

Hazardous and other wastes are not to be stored for more than ninety days in the premises and a record of such wastes should be maintained and made available for the inspection. SPCBs/PCCs can extend the said period of ninety days in cases of small generators (up to 10 Tonnes/Annum), actual users and disposal facility operators, occupiers not having access to any common treatment, storage, disposal facility in the concerned State, etc., which have also been laid down under Rule 8 of the HOWM Rules, 2018.

D. Utilisation of hazardous or other wastes

Procedures for utilisation of hazardous and other wastes as a resource or after pre-processing either for co-processing or for any other use have been laid down under Rule 9 of the HOWM Rules, 2016, and the same are to be carried

out only after obtaining authorization from the concerned SPCB/PCC on the basis of standard operating procedures or guidelines provided by CPCB.

E. Import and Export (Transboundary Movement) of hazardous and other wastes

Import of hazardous and other wastes from any country is permitted only for recycling/reuse/recovery and utilisation including co-processing and list of wastes which are prohibited for import to the country has also been stipulated. Ministry of Environment, Forest and Climate Change (MoEF&CC) has been stipulated as the nodal Ministry to deal with the transboundary movement of the hazardous and other wastes.

Procedures for import and export of hazardous and other wastes have been prescribed such as making an application to MoEF&CC, furnishing information to custom department, etc. It also lays down conditions where Import/Export shall be deemed illegal and the role of Customs authority and SPCB/PCC in such cases. Rule 11 to Rule 14 of the HOWM Rules, 2016, lays down provisions with regard to the said import and export.

F. Treatment, storage and disposal facility for hazardous waste

State government, occupier, operator of facility or any association of occupiers are individually or jointly or severally be responsible for identification of sites for establishment of facility for treatment, storage and disposal of hazardous and other wastes in the State.

Operator of common facility or occupier of captive facility is required to set up the same as per technical guidelines issued by CPCB and obtain approval for design and layout from the SPCB/PCC. Occupier/Operator of facility is also responsible for maintaining records, safe and environmentally sound operation of facility and its closure and post-closure phases as per CPCB guidelines. SPCB/PCC is required to monitor setting up and operation of the common facility, regularly. Such provisions have been stipulated under Rule 16 of the HOWM Rules, 2016.

G. Packaging, Labelling and Transportation of hazardous waste

Procedures for packaging have been prescribed for safe handling, packaging, storage and transportation of hazardous wastes under Rule 17 of the HOWM Rules, 2016. Procedures for transportation of hazardous wastes such as in accordance with Motor Vehicles Act, 1988; providing relevant information regarding hazardous nature of wastes, emergency measures, labelling, obtaining no objection certificate from SPCB/PCC in case of transportation

for final disposal to other State, transportation by sender or receiver, etc. have been laid down under Rule 18 of the HOWM Rules, 2016.

H. Manifest System (Movement Document) for movement of hazardous waste

The Rule 19 lays down provisions of Manifest System (Movement Document) in various colour-coded manifest (07 colour codes) prescribed as Form 10 which travels with hazardous waste from the point of generation, through transportation, to the final recycling, utilization or disposal facility, as the case may be, as well as intimation of the same to the sender, transporter, receiver and the concerned SPCB/PCC at various stages such as at the time of handing over the waste to transporter and transporter to the receiver.

I. Records and returns

Occupier/Operator is required to maintain date wise records of handling and management of hazardous wastes and send annual returns to SPCB/PCC by 30th June of every financial year about hazardous wastes generation, storage, recycling, utilisation, disposal, etc. Based on which SPCBs/PCCs are required to prepare annual inventory of the waste generated, recycled, utilized, disposed, etc. for the respective State/UT and submit the same to CPCB by 30th September of every financial year. CPCB is required to prepare consolidated report on management of hazardous wastes and submit the same to the Ministry of Environment, Forest and Climate Change before 30th December once in every year. The SPCBs/PCCs shall prepare an annual inventory of the waste generated, recycled, recovered, utilised including co-processed; re-exported, disposed, etc. and submit by 30th day of September every year along with the inventory of hazardous waste generators, actual users, and common and captive disposal facilities to CPCB every two years. CPCB shall prepare the consolidated review report on management of hazardous and other wastes and forward it to the Ministry of Environment, Forest and Climate Change along with its recommendations before 30th day of December once in every year. Provisions in these regards have been stipulated under Rule 20 of the HOWM Rules, 2016.

J. Liability of occupier, importer or exporter and operator of a disposal facility and Financial Penalty

The occupier, importer or exporter and operator of the disposal facility is liable for all damages caused to the environment or third party due to improper handling and management of hazardous and other wastes. Further, occupier and operator of a disposal facility are also liable to pay financial penalty levied

by SPCBs/PCC for violation of provisions under these Rules with prior approval of CPCB, as laid down under Rule 23.

K. Accident reporting

Occupier/Operator of facility is required to immediately intimate the SPCB/PCC through telephone/ e-mail/ about the accident and subsequently send a report as stipulated under Rule 22 of the HOWM Rules, 2016.

3. Provisions about financial penalty and liability for damages caused to the environment under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

Rule 23 of the HOWM Rules, 2016, lays down provisions with regard to liability for damages caused to the environment or third party including financial penalty for violation of provisions of the Rules and the same is reproduced as below:

"23. Liability of occupier, importer or exporter and operator of a disposal facility.-

(1) The occupier, importer or exporter and operator of the disposal facility shall be liable for all damages caused to the environment or third party due to improper handling and management of the hazardous and other waste.

(2) The occupier and the operator of the disposal facility shall be liable to pay financial penalties as levied for any violation of the provisions under these rules by the State Pollution Control Board with the prior approval of the Central Pollution Control Board."

CPCB has issued "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty" for implementing the aforesaid provisions of Rule 23. The guidelines include description of liabilities, approach for valuation of the same, methodology for levying financial penalty, role of SPCB/PCC and other stakeholders etc. SPCBs/PCCs are required to follow procedures laid down under these guidelines while enforcing the aforesaid provisions of Rule 23. Copy of the said guidelines is given at **Annexure I** and is also available at CPCB website **http://cpcb.nic.in/uploads/hwmd/Guidelines_Environmenal_Damages_Costs_200116.pdf**

4. Categorization of violations and financial penalty & environmental compensation thereof

For the purpose of imposing financial penalty and environmental compensation, various violations of HOWM Rules, 2016, can be broadly classified into the following two categories:

A. Category A: Only procedural violations of HOWM Rules, 2016, which has not caused damage to environment or third party

Certain violations of HOWM Rules, 2016, are procedural violations in nature and do not cause any damage to environmental or third party.

For instance, an authorised occupier has collected, stored, packaged, transported and handed over all his hazardous or other wastes generated to authorised recyclers/utilizers in environmentally safe manner but has not sent annual return within the stipulated time period to SPCB/PCC (as required under Rule 20(2) of the HOWM Rules, 2016) or has not given prior intimation to SPCB of the States of transit in case of inter-state movement (as required under Rule 18(5) of the HOWM Rules, 2016), etc. In such cases, though there have been violations of provisions of the Rules which are procedural requirements in nature but has not caused damaged to the environment. However, financial penalty would be applicable in such cases for violations of each and every relevant provision of the HOWM Rules, 2016, as outlined under section 5 of this document.

B. Category B: violations causing environmental damage including procedural violations

These are violations of the HOWM Rules, 2016, causing environmental damages including procedural violations of the Rules. The same may further be classified into two categories as below:

(i) Category B1: Cases where mismanagement of hazardous or other waste has resulted or resulting into environmental damage and such damages liability including assessment of remediation required can be assessed in terms of cost also by applying provisions laid down under CPCB's "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty".

For example, disposal of hazardous or other waste on land or surface/ground water by an occupier, operator, transporter, importer, exporter, etc. as the case may be, has been identified by SPCB/PCC and damages to the environment and remediation work as well as cost thereof can also be assessed by SPCB/PCC in accordance with the said

guidelines. In such cases, liability of the responsible party (occupier, operator, transporter, importer, exporter, etc., as the case may be) can be fixed in terms of various required activities and amount of money required in such activities (i.e. taking up immediate Emergency Response Plan Measures such as containment of hazardous or other waste; assessment of contamination and required remediation work, and; execution of selected remediation plan) in accordance with provisions laid down under the said CPCB's "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty". The responsible party (occupier, operator, transporter, importer, exporter, etc., as the case may be) is required to pay bank guarantee to SPCB/PCC and compensation liability (loss of property, loss of crop, loss of life, treatment cost towards human health impacts, etc.) as suggested in the guidelines. Copy of the said guidelines is given at **Annexure I.**

Besides, financial penalty would also be imposed as given under section 5 of this document

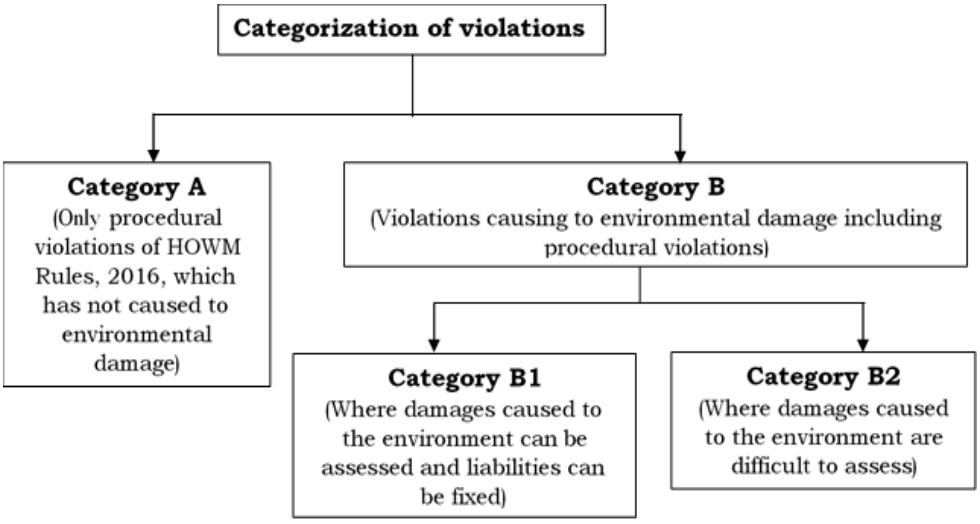

Figure1: Categorization of violations

(ii) **Category B2**: Cases where mismanagement of hazardous or other waste may have caused environmental damage and such damages & remediation required including cost thereof are difficult to assess.

For example, an authorised occupier, operator, transporter, importer, exporter, etc., as the case may be, of hazardous or other wastes has illegally disposed hazardous or other waste on place which is unidentifiable or even if identified, damages to the environment and

remediation work as well as cost thereof is difficult to be assessed by SPCB/PCC. Such difficulty may arise due to very small quantity of wastes involved in such acts, wastes disposed along with municipal solid waste, wastes may have been washed off with runoff water, etc. In such cases, it may be difficult to assess damages caused to the environment and liability of the responsible party (occupier, operator, transporter, importer, exporter, etc., as the case may be) as well as cost thereof.

Under such circumstances, methodology for imposing financial penalty and environmental compensation are given under section 5 of this document.

5. Methodology for Assessing Financial Penalty and Environmental Compensation

A. Financial Penalty

In accordance with provisions under Rule 23(2) of HOWM Rules, 2016 and section 15 of the Environment (Protection) Act, 1986, CPCB guidelines on "Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty" (given at **Annexure I**) stipulate that financial penalty to be levied by the concerned SPCB/PCC for any violation may be limited to maximum of one lakh rupees per provision violated so as to ensure that levying of financial penalty remain within the brief of the Environment (Protection) Act, 1986, since the said Rules have been notified under the Environment (Protection) Act, 1986. However, non-compliance may attract violation of one or several provisions of the said Rules and thus the total financial penalty amount may be arrived by adding up number of provisions violated. Further, additional fine up to Rupees five thousand rupees for every day may also be imposed in case of failure continues by the responsible party beyond period by which remedial/corrective measures would have been implemented as suggested by the SPCB/PCC.

Therefore, financial penalty requires to be imposed and collected from the violators as maximum of Rs. 1 lakh for violation of each provision stipulated under HOWM Rules, 2016 (in addition to the environmental compensation which has been discussed in section B below). List of various violations vis-à-vis provisions of HOWM Rules, 2016 is given at **Appendix A** for ready reference.

Total numbers of violation will vary on case to case basis. For instance (indicative only), unit found generating any hazardous or other waste

and disposing or handing over their waste to unauthorized person/places without complying any provisions of the HOWM Rules, 2016, may attract violation of 25 numbers of provisions (at S. No. 1, 2, 3, 4, 5(a), 5(b), 6 number of violations at 6(A), 6(D), 8, 31, 32, 33, 34, 39, 40, 41, 42, 49, 47 and 50 of Appendix A). There could be other several scenarios, therefore, total financial penalty amount be derived using the said approach.

B) Environmental Compensation-

For category B1 violations, steps as suggested in the above section 4(B)(i) may be followed in accordance with provisions laid down under the said CPCB's "Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty" (given at **Annexure I**). For category B2 violations, environmental compensation as suggested below may be considered.

Quantity of hazardous or other wastes, which may have caused environmental damages, may be proportionate to extent of damages thereof. Environmental compensation may, therefore, be directly correlated with the quantity of hazardous or other waste under reference. It may be difficult to assess extent of damages which may have been caused elsewhere or the damages which have been assimilated by nature. At the same time, sometimes it may not be practically feasible to know quantity of hazardous or other wastes which have been disposed illegally. For instance, a facility, particularly unauthorised unit, is operating for certain years who has never assessed or documented hazardous or other wastes generated by them and has no document to support that the same have been disposed in environmentally sound manner in compliance with the regulations existing since 1989. Further, such facility may have changed their industrial process or raw materials or products, thereby variation in quantity of the wastes generated during such period. Whereas a facility possessing authorization under the Rules is granted the authorisation specifying categories and quantity of the hazardous or other wastes based on declarations made by the unit while making application for the same.

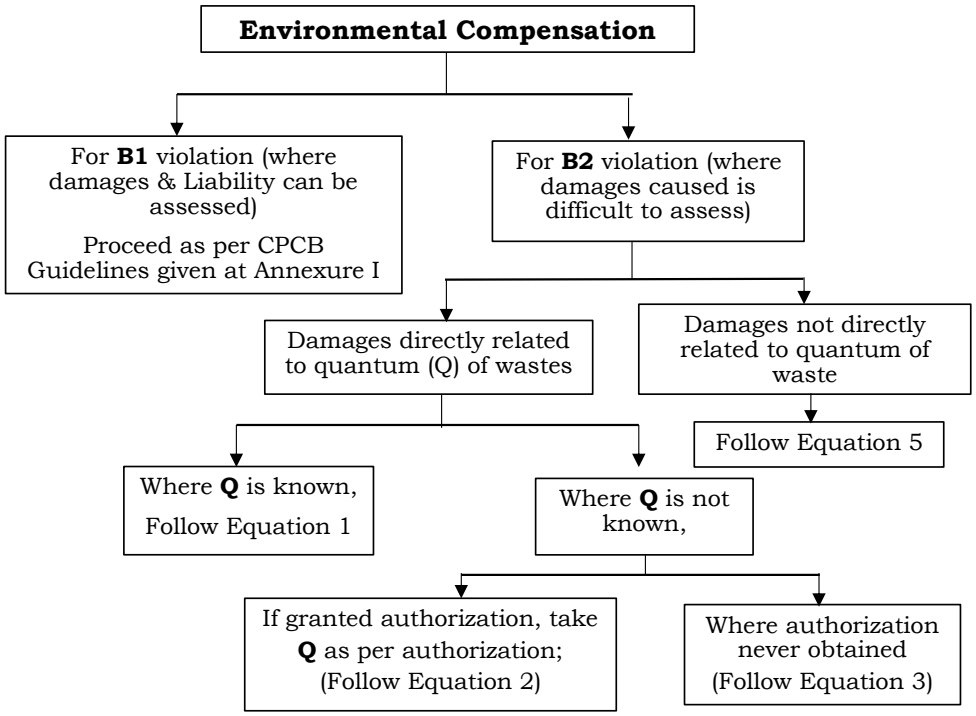

Figure 2. Approach for calculating environmental compensation in brief

Under such wide variables, the following quantity based environmental compensation calculation in Rupees may be used and be imposed on violating facility operator:

Environmental Compensation (EC) = Q x ERF x R

[……Equation 1]

Where,

Q is noticed[1] or observed[1] quantity (in tonne) of hazardous or other wastes which have not been managed in compliance with various provisions of the Acts/Rules/Guidelines/conditions of the

[1] Noticed or observed quantity is the reported quantity or that has come to the notice of SPCB/PCC/CPCB/MOEF&CC. For instance, an authorised utilizer has authorisation to utilise 100 tonnes of certain hazardous waste/annum from which 200 tonnes of product is derived whose use has been specified in SOP issued by CPCB for industrial use only. He may have produced say 150 tonnes of product but it has come to the notice (through inspection or complain verification) of SPCB/PCC/CPCB that he has sold 10 tonnes of the product in open market and not to any industry. Here, Q would be 5 tones. Similarly, an authorised industrial unit authorised for 100 tonne of per annum generation of waste has not sent such waste to common TSDF or any other authorised facility nor is found stored in his premise. Here Q would be 100 tonne.

authorisation/directions issued by CPCB/SPCB/PCC/MoEF&CC (barring procedural violations which have not caused environmental damage)

ERF = Environmental Risk Factor which is a number (as given in Table 1 below) denoting the increasing degree of risk to the environment and human health due to the scenarios as given in the Table 1.

Table 1: Environmental Risk factor (ERF)

S. No.	Violation	ERF	
		For Hazardous Waste	For Other* Waste
1.	When hazardous and other wastes is disposed at unauthorised place or handed over or sold to unauthorised party	1.5	0.3
2.	When treatment has not been imparted , as required, but only partial treatment has been given (by TSDF/Actual user)	1.0	0.2
3.	When product (derived from hazardous or other waste) is not confirming to prescribed specification or is specified for restricted use but sold in open market against (in case of actual user)	1.0	0.2
4.	Wastes found stored beyond the stipulated period (refer Rule 8 of the HOWM Rules, 2008)	0.1	0.05

***Applicable to waste generated indigenously only.*

R= Environmental Compensation factor, which may be taken as Rs. 30,000.

Note:

(i) For facility engaged in generation/ recycling/ utilizing/ disposing of hazardous or other waste and such wastes have never been handed over to common TSDF/ actual user:

Case I: *If authorisation has been taken at any point of time, in such cases, Q may be taken as below:*

Q= Quantity in terms of tone/per year, as specified in authorisation (one year =300 days) x **Y**

[……Equation 2]

Where, **Y** is Number of years of operation of the facility and may be considered as given in Table 6 below. In case authorisation is given in quantity/day, then convert in tone/year by multiplying the same with 300 days.

Case II: *If authorisation has not been taken at any point of time for all or any given category of hazardous or other waste being generated/utilized*

When above scenario comes to the notice of SPCB/PCC/CPCB, it may be difficult to find Q as records pertaining to quantity of generation/utilization of hazardous or other waste may not be available. In such case, a generalised way of calculating Environmental Compensation (EC) in Rupees may be used as below:

EC (in Rupees) = T x S x C x ECF x Y

[……Equation 3]

Where,

T = Type of facility factor and may be taken as below from Table 2 below:

Table 2: Type of facility factor

Sl. No.	Scale of operation	Factor
1.	(i) Actual user procuring hazardous waste from outside their premises including importing hazardous or other waste from other country	1.5
2.	(i) Actual user engaged in utilizing/ recycling of only other wastes which are generated indigenously, and; (ii) All facility other than at Sl. No. (1) and 2(i) above	1

S = Scale of Operation factor of the facility and may be taken from Table 3 as below:

Table 3: Scale of operation of the facility

Scale of operation	Scale Factor
Large	1.5
Medium	1
Small or Micro	0.5

ECF = Environmental Compensation Factor, which is summation of one or more ECF, as applicable, as given in Table 4 below:

Table 4: Environmental Compensation Factor

S. No	Type of operations from where waste is generated	ECF
1.	Main Process (when significant quantity of waste generation like spent acid, process sludge, spent solvent, etc.)	45,00,000
2	Pollution control equipment like ETP, APCDs, etc. such as ETP sludge, incineration bottom residues, cyclone residue, etc.	35,00,000
3	Ancillary equipment used for supporting the industrial process such as DG set, etc.	10,00,000
4	Handling of hazardous chemicals and wastes (waste packaging materials like emptied drums/bags/etc. contaminated with hazardous chemicals/wastes) and Cleaning activities like cotton/cloth waste contaminated with oil/grease/grease, hazardous chemical storage tank, etc.	20,00,000
5.	Other operations not listed above	10,00,000

C = Category of Facility factor and be taken from Table 5 as given below;

Table 5: Category of Facility Factor

Type of Facility	T Factor
Red Category	1
Orange Category	0.2
Green Category	0.05

Y = Number of years of operation of the facility and may be considered from Table 6 as below:

Table 6: Number of days of operation of the facility

S.No	Years of Operations	Factor to be taken
1.	More than 03 years	5
2.	Equal to less than 03 years	Actual duration of operation in months/12

(ii) In cases where non-compliances have been observed for known period wherein quantity (Q) of hazardous or other waste correlated to such violations is also known – e.g. in-adequate storage facility in cases of authorised facility or failure to comply with any directions of SPCB/PCC/CPCB (say directions issued w.r.t. non-compliance of incinerator emission standards and facility continued to

operate). Amount of EC for such cases may be calculated based on Q associated with such violations period and number of days for which violation took place. Such number of days for which violation took place is the period between the day of violation observed/ due date of compliance of directions and the day of compliance verified by CPCB/ SPCB/ PCC.

EC = EC (as derived from Equation 1) + (Rs. 5000 x Nos. of days for which violation took place]

[……Equation 4]

(iii) Apart from the above cases, there could be following violations or other similar type violations (which are not covered in the various above mentioned scenarios) in hazardous waste TSDF or actual user facility:

a. The leachate is illegally disposed or send to unauthorised party
b. Violations in leachate management or the leachate management facility requires upgradation as per direction of CPCB/ SPCB/ MoEF&CC
c. Waste Water generated during the process is disposed illegally or not as per the consent conditions
d. Effluent Treatment Plant is not meeting the norms stipulated under EPA, 1986 or CTO issued by SPCB/PCC
e. Effluent Treatment Plant exist but requires upgradation so as to meet the conditions specified under CTO or CPCB' guidelines/SoP
f. Treated effluent not managed as per the conditions specified under CTO or CPCB' guidelines/SoP

Under such circumstances, the environment compensation may be calculated as below:

Environmental Compensation (EC) = PI×N×R×S×LF

…..Equation 5]

Where,

PI is Pollution index (based on the CPCB guidelines on Revised Classification of Industrial Sectors under Red, Orange, Green and White Categories) and to be taken from Table 7 below:

Table 7: Classification of industrial sector

Category	Pollution Index
Red	80
Orange	50
Green	30

N is Number of days for which violation took place is the period between the day of violation observed/ due date of compliance of directions and the day of compliance verified by CPCB/ SPCB/ PCC.

R is Environmental Compensation factor in Rupees R to be taken as 250

S = Scale of Operation of the facility and may be taken from Table 8 below;

Table 8: Scale of operation

Scale of operation	Factor
Micro or small	0.5
Medium	1.0
Large	1.5

LF could be based on population of the city/town and location of the industrial unit. For the industrial unit located within municipal boundary or up to 10 km distance from the municipal boundary of the city/town, following factors (LF) may be taken from Table 9 below:

Table 9: Location factor based on population

S. No.	Population* (million)	Location Factor#
1	Less than 1	1.0
2	1 to < 5	1.25
3	5 to <10	1.5
4	10 and above	2.0

*population of the city/town as per the latest Census of India

LF will be 1.0 in case unit is located > 10km from municipal boundary

For critically populated areas/Ecologically sensitive areas, the scope of LF may be examined further.

C. Deterrent Factor

(a) In case of non-timely submission of Environmental Compensation and Financial Penalty

The Environmental Compensation Charges and Financial Penalty shall be deposited by the violating facility within the stipulated time period specified under directions issued by CPCB/SPCB/PCC. In case, such facility does not submit the same within the stipulated time frame the amount will be exponentially increased. The details of exponential increase are given below:

Table 10: Environmental Compensation Charges and Financial Penalty w.r.t. non-timely submission

Sl. No.	Amount Deposition time period	Environmental Compensation and Financial Penalty Amount
1.	Within 15 days from the stipulated time period as directed by CPCB/SPCB/PCC	Original amount with interest @ 12% per annum for number of days delayed after the stipulated date of amount deposition
2.	After 15 days but within 03 months after the stipulated time period as directed by CPCB/SPCB/PCC	Two times the original amount with interest @ 12% per annum for number of days delayed after 15 days of the stipulated date of
3.	After 03 months and up to 06 months from the stipulated time period	Four times the original amount with interest @ 12% per annum for number of days delayed after three months of the stipulated date of amount deposition
4.	After 06 month	Closure of unit/facility and court

(b) In case of repeated violations

In case the violators found repeatedly non-complying with previous violations or new violations, the amount of Environmental Compensation and Financial Penalty be exponentially increased. The details of exponential increase in such cases are given below:

Table 11: Environmental Compensation Charges in case of repeated violation

Sl. No.	Time Period for compliance	Environmental Compensation and Financial Penalty Amount
1.	First time violation	Original amount
2.	Second time violation	Two times the original amount
3.	Third time violation	Four times the original amount
4.	Fourth time violation	Closer of unit and Court case

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Annexure-I

Hazardous Waste Management
Series : HAZWAMS/40/2015-16

Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty




CPCB

January 2016

Central Pollution Control Board
(Ministry of Environment, Forest & Climate Change, Government of India)
Parivesh Bhawan, East Arjun Nagar,
Shahdara, Delhi – 110032

Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty

CPCB

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FOREWORD

Hazardous waste is required to be stored, packaged, transported or recycled/utilized/disposed in an environmentally sound manner in compliance with the provisions stipulated under the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, notified under the Environment (Protection) Act, 1986. Improper handling or disposal of hazardous waste may lead to environmental damages and violations of provisions laid down under the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008. Rule 25 of the said Rules lays down provisions for liability of occupier, transporter, operator of a facility and importer. The Rule 25(1) stipulates that the occupier, importer, transporter and operator of the facility shall be liable for all damages caused to the environment or third party due to improper handling of the hazardous wastes or disposal of the hazardous wastes. Further, Rule 25(2) stipulates that the occupier and the operator of the facility shall be liable to pay financial penalties as levied for any violation of the provisions under these Rules by the State Pollution Control Board with the prior approval of the Central Pollution Control Board.

Incidences of fire, spillage, illegal disposal, etc. of hazardous waste are being noticed regularly which necessitates systematic imposition of liability on occupier, importer, transporter and operator of the facility, as the case may be, for damages caused to the environment or third party as well as levy financial penalty for violation of the provisions of the Rules so as to enforce Rule 25. However, assessing various types of liabilities and translating the same in terms of monetary value are challenges before the implementing agencies such as State Pollution Control Boards (SPCBs)/ Pollution Control Committees (PCCs). Similar difficulties have also been faced in arriving at financial penalties to be levied for various kind of violations on the occupier, importer, transporter and operator of a facility.

With an objective to address the above, these guidelines have been prepared along with description of liabilities, approach for valuation, methodology for levying financial penalties, role of SPCB/PCC and other stakeholders etc. Consultations were held with industries, experts, academic institutes, SPCBs/PCCs etc. The Ministry of Environment, Forest & Climate Change, Govt. of India, has accorded its approval to these guidelines. I am sure these guidelines shall be very helpful to SPCBs/PCCs and other stake holders in implementing provisions of the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008.

I shall like to put on record my appreciation for work done by my colleagues Shri Bharat K Sharma, Scientist, 'E', Shri B. Vinod Babu, Scientist E & I/c HWMD, and Smt. Deepti Kapil, Scientist 'C'.

(A. K. Mehta)
Chairman

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1 BACKGROUND

For safe handling and management of hazardous waste in an environmentally sound manner, Government of India (GOI) has notified the Hazardous Waste (Management & Handling) Rules, 1989, under the Environment (Protection) Act, 1986. However, these Rules were suppressed with re-notification of the Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008.

Under the said Rules, hazardous waste has been defined as those wastes which by reason of any of its physical, chemical, reactive, toxic, flammable, explosive or corrosive characteristics causes danger or is likely to cause danger to health or environment, whether alone or when in contact with other wastes or substances, and shall include wastes as specified in Schedules of the Rules.

The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, lays down provisions for requirement of authorization from the concerned State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC) for generation, processing, treatment, package, storage, transportation, use, collection, destruction, conversion, offering for sale, transfer or the like of the hazardous waste, packaging, labeling, transportation, treatment, recycling, disposal, etc. of hazardous waste. The Rules also stipulate provision of liability of occupier, transporter, operator of a facility and importer for all damages caused to the environment or third party due to improper handling or disposal of the hazardous wastes as well provision to pay financial penalties as levied for any violation of provisions under the Rules.

In order to enforce the aforesaid provision of the Rules, assessment of damages caused to the environment or third party due to improper handling or disposal of the hazardous wastes (such as but not limited to, illegal disposal/ spillage of hazardous waste or fire from improper handling/disposal of hazardous waste) is the foremost requirement besides taking immediate measures for control/containment of impacts upon such incidences. Liability to occupier or importer or transporter or operator of the facility, as the case may be, can be assigned for immediate response, site assessment and remediation and also for compensating the damages caused to third parties. Upon immediate reporting of such incidences, every State Pollution Control Board (SPCB)/ Pollution Control Committee (PCC) is expected to have a well-defined system in place to deal with such emergency along with protocol to be followed. A well-defined system will help in adopting a systematic approach towards reporting/inspection of such incidences of spillages/ disposal/ fire because of improper handling/disposal of hazardous wastes and also in implementing environmental damage liability and financial penalty for violation, if any.

This document outlines various liabilities to be imposed on a responsible party for causing environmental damages arising from improper handling/disposal of hazardous waste. These liabilities are applicable to the occupier, transporter, operator of a facility and importer as the case may be, hereinafter referred to as responsible party. The guidelines also identify the compensation liabilities on a responsible party for causing impacts such as injury, loss of life, effects on flora and fauna, loss of livelihood, reduced yield from crops, property loss, etc. However, evaluation and implementation of the same are not covered in the scope of this document, which may be dealt with by the concerned agency of respective State/UT Government. Role of the responsible party and the concerned SPCB/PCC have been outlined in the event of occurrence of incidences. Further, an attempt has also been made to provide an indicative cost for assessment and

remediation, which may, however, vary case to case. The document also provides guidelines for evaluating and implementing financial penalty for violation of provisions stipulated under the Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008.

This document is in compliance with the order dated 18/2/2014 of the Hon'ble National Green Tribunal, (Western Zone) Bench, Pune, in the matter of Application No. 87/2013(WZ), Ramubhai Kariyabhai Patel& others versus Union of India& others, wherein it has been ordered that "Gujarat Pollution Control Board and Central Pollution Control Board shall immediately undertake efforts for capacity building within their organizations and also, other SPCBs for scientific handling of such accidents, through training and preparation of guidelines and manuals, particularly enforcement of Rule 25 (1) and (2) of HW Rules, 2008. This is utmost essential to develop such capacity in SPCBs and CPCB as they are the scientific and technical organizations having responsibility to handle such environmental hazards and therefore, it is necessary to ensure adoption of suitable scientific tools and techniques to develop suitable response to such accidents".

2 LEGAL FRAMEWORK

The National Environment Policy was published by the Ministry of Environment, Forests & Climate Change, GOI, in 2006. This policy is intended to be a guide to action: in regulatory reform, programmes and projects for environmental conservation; and review and enactment of legislation, by agencies of the Central, State, and Local Governments. One of the guiding principles of the National Environment Policy is legal liability. It stipulates that civil liability for environmental damage would deter environmentally harmful actions, and compensate the victims of environmental damage. Conceptually, the principle of legal liability may be viewed as an embodiment in legal doctrine of the "polluter pays" approach, itself deriving from the principle of economic efficiency.

The Section 9 of the Environment (Protection) Act, 1986, stipulates provision about furnishing of information to authorities and agencies and remedial measures where discharge of any environmental pollutant in excess of the prescribed standards occurs or is apprehended to occur due to any accident or other unforeseen act or event. The same is reproduced as below:

9. *Furnishing of information to authorities and agencies in certain cases*

(1) Where the discharge of any environmental pollutant in excess of the prescribed standards occurs or is apprehended to occur due to any accident or other unforeseen act or event, the person responsible for such discharge and the person in charge of the place at which such discharge occurs or is apprehended to occur shall be bound to prevent or mitigate the environmental pollution caused as a result of such discharge and shall also forthwith--

(a) intimate the fact of such occurrence or apprehension of such occurrence; and

(b) be bound, if called upon, to render all assistance, to such authorities or agencies as may be prescribed.

(2) On receipt of information with respect to the fact or apprehension on any occurrence of the nature referred to in sub-section (1), whether through intimation under that sub-section or otherwise, the authorities or agencies referred to in sub-section (1) shall, as early as practicable, cause such remedial measures to be taken as necessary to prevent or mitigate the environmental pollution.

(3) The expenses, if any, incurred by any authority or agency with respect to the remedial measures referred to in sub-section (2), together with interest (at such reasonable rate as the Government may, by order, fix) from the date when a demand for the expenses is made until it is paid, may be recovered by such authority or agency from the person concerned as arrears of land revenue or of public demand.

In exercise of powers conferred under Sections 6 and 25 of the Environment (Protection) Act, 1986, GOI has notified Environment (Protection) Rules, 1986. The Rule 12 of the said Rules and amendments made thereof lays down the aforesaid authorities who shall be intimated about the said occurrence or apprehension of such occurrence. The said provision is reproduced as below:

12. Furnishing of information to authorities and agencies in certain cases

Where the discharge of environmental pollutant in excess of the prescribed standards occurs or is apprehended to occur due to any accident or other unforeseen act or event, the person in charge of the place at which such discharge occurs or is apprehended to occur shall forth with intimate the fact of such occurrence or apprehension of such occurrence to all the following authorities or agencies, namely:-

(i) The officer-in-charge of emergency or disaster relief operation in a district or other region of a state or Union territory specified by whatever designation by the Government of the said State or Union territory, and in whose jurisdiction the industry, process or operation is located.

(ii) Central Board or a State Board as the case may be and its regional officer having local jurisdiction who have been delegated powers under section 20, 21, 23 of the Water (Prevention and Control of Pollution) Act 1974 (6 of l974)- and section 24 of the Air (Prevention and Control of Pollution) Act, 1981 (14 of 1981).

(iii) The statutory authorities or agencies specified in column 3 in relation to places mentioned in column 2 against thereof of the Schedule II.

The said Schedule II is given at Annexure I.

The Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008, has been notified by GOI exercising the powers conferred by Sections 6, 8 and 25 of the Environment (Protection) Act, 1986. Besides laying down provisions for handling and management of hazardous waste, it also stipulates provision of accident reporting and liability of occupier, transporter, operator of a facility and importer with regard to damages caused to the environment or third party due to improper handling of hazardous wastes. Provision of paying financial penalty for any violation of the provisions under the Rules has also been stipulated. The same is reproduced as below:

24. Accident reporting and follow-up.- Where an accident occurs at the facility or on a hazardous waste site or during transportation of the hazardous waste, the occupier or operator of the facility or the transporter, as the case may be, shall report immediately to the State Pollution Control Board about the accident in Form14.

25. Liability of occupier, transporter, operator of a facility and importer.-

(1) The occupier, importer, transporter and operator of the facility shall be liable for all damages caused to the environment or third party due to improper handling of the hazardous wastes or disposal of the hazardous wastes.

(2) The occupier and the operator of the facility shall be liable to pay financial penalties as levied for any violation of the provisions under these rules by the State Pollution Control Board with the prior approval of the Central Pollution Control Board.

Under the National Green Tribunal Act 2010, the National Green Tribunal has been established for effective and expeditious disposal of cases relating to environmental protection and conservation of forests and other natural resources including enforcement of any legal right relating to environment and giving relief and compensation for damages to persons and property and for matters connected therewith or incidental thereto. The principles of sustainable development, the precautionary principle and the polluter pays principle are applied for passing any order or decision or award by the Tribunal. The National Green

Tribunal Act 2010, lays down provisions for Relief, compensation, restitution and liability vide section 15 and 17 and the same are reproduced as below:

15.(1) The Tribunal may, by an order, provide,-

a. relief and compensation to the victims of pollution and other environmental damage arising under the enactments specified in the Schedule I (including accident occurring while handling any hazardous substance);

b. for restitution of property damaged;

c. for restitution of the environment for such area or areas, as the Tribunal may think fit.

(2) The relief and compensation and restitution of property and environment referred to in clauses (a), (b) and (c) of sub-section (1) shall be in addition to the relief paid or payable under the Public Liability Insurance Act, 1991.

(3) No application for grant of any compensation or relief or restitution of property or environment under this section shall be entertained by the Tribunal unless it is made within a period of five years from the date on which the cause for such compensation or relief first arose:

Provided that the Tribunal may, if it is satisfied that the applicant was prevented by sufficient cause from filing the application within the said period, allow it to be filed within a further period not exceeding sixty days.

(4) The Tribunal may, having regard to the damage to public health, property and environment, divide the compensation or relief payable under separate heads specified in Schedule II so as to provide compensation or relief to the claimants and for restitution of the damaged property or environment, as it may think fit.

(5) Every claimant of the compensation or relief under this Act shall intimate to the Tribunal about the application filed to, or, as the case may be, compensation or relief received from, any other court or authority.

17(1) Where death of, or injury to, any person (other than a workman) or damage to any property or environment has resulted from an accident or the adverse impact of an activity or operation or process, under any enactment specified in Schedule I, the person responsible shall be liable to pay such relief or compensation for such death, injury or damage, under all or any of the heads specified in Schedule II, as may be determined by the Tribunal.

(2) If the death, injury or damage caused by an accident or the adverse impact of an activity or operation or process under any enactment specified in Schedule I cannot beat attributed to any single activity or operation or process but is the combined or resultant effect of several such activities, operations and processes, the Tribunal may, apportion the liability for relief or compensation amongst those responsible for such activities, operations and processes on an equitable basis.

(3) The Tribunal shall, in case of an accident, apply the principle of no fault.

The said Schedule II is given at Annexure II.

The National Green Tribunal Act, 2010, has also provisions of penalty for failure to comply with orders of Tribunal. Section 26 of the Act stipulates that whoever, fails to comply with any order or award or decision

of the Tribunal under this Act, he shall be punishable with imprisonment for a term which may extend to three years, or with fine which may extend to ten crore rupees, or with both and in case the failure or contravention continues, with additional fine which may extend to twenty-five thousand rupees for every day during which such failure or contravention continues after conviction for the first such failure or contravention. However, the fine payable by Companies may extend to twenty five crore rupees and one lakh rupees a day in case of continuing default.

Thus, regulatory framework exists in the country that requires a potential polluter to be liable for all damages caused to the environment or third parties due to improper handling of the hazardous wastes or disposal of the hazardous wastes. Further, provisions have also been laid down in respect of financial penalties associated with improper handling or disposal of hazardous wastes.

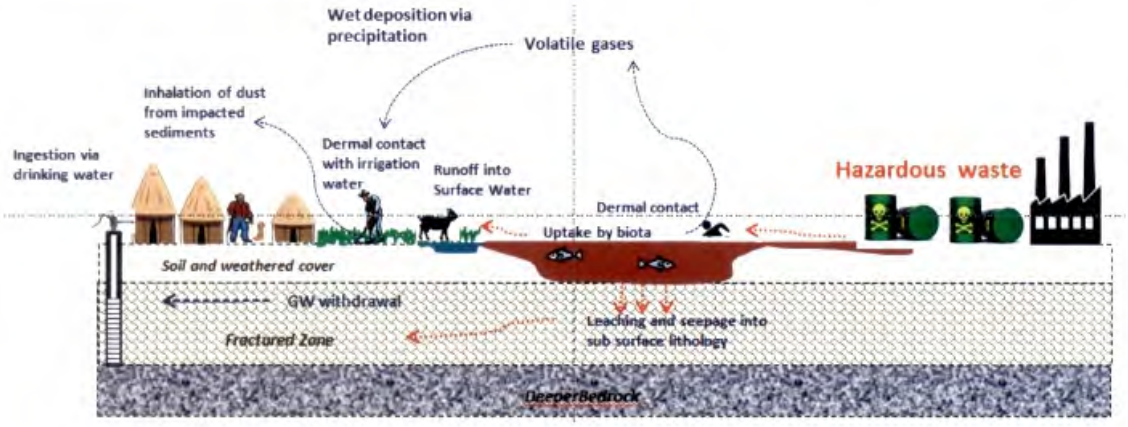
3 DESCRIPTION OF IMPACTS

Impacts to the environment can be caused through a variety of mechanisms. It is not the intent of this guideline document to capture all possible contamination scenarios that may occur in a multitude of permutations and combinations (e.g. leaking underground storage tanks, unlined drains, waste dumping, spillage of wastes, leaking pipes, etc.) that may impact the natural resources i.e. soil, groundwater and surface water bodies. However, this document mainly focuses on the issues pertaining to environmental impacts arising from dumping of hazardous wastes in open land, inappropriate handling of hazardous wastes at operating facilities, spillage of hazardous wastes during handling or transportation, failures of various engineering systems that would otherwise contain a hazardous waste (e.g. secure landfills, storage sumps/containers, etc.), etc.

Contamination to soil, groundwater and surface water are the main media of contamination covered under this document (impacts on media such as air, sea/ oceans etc., are currently not covered under this document). Contaminated natural resources (soil, groundwater and surface water) have impacts on various receptors, which need to be addressed when dealing with the liabilities that have to be allocated to the polluters.

Impacts also include long term effects on the natural resources themselves, which if affected by contamination, become unusable by the general public. Once contaminated, natural resources require an inordinately long time to replenish and revert back to original status. In most cases, in spite of active remediation efforts, a contaminated resource does not typically revert back to its original (pre-contaminated) state.

The figure below shows an indicative conceptual site model, depicting the different pathways and receptors that run the risk of being exposed to any contaminant in soil, groundwater and surface water due to impact from hazardous waste dumping/leakages.



3.1 Impacts on Soil

Typical examples of how soils are impacted by hazardous wastes include, but are not limited to:

- Clandestine Illegal dumping of hazardous waste on open parcels of land;
- Discharge of liquid hazardous waste onto open parcels of land;
- Breaches of landfill wherein hazardous wastes might either get spilled onto open parcels of adjoining land, and/ or sub grade breaches where hazardous wastes and/ or landfill leachate seeps into the subsoil and potentially into the aquifer;
- Spills/ leaks of hazardous wastes during transportation, leakages from trucks, tanks, pipelines, other fixed or mobile storage containers etc.

Impacted soils can lead to indirect impacts to environment including rendering the land not fit for agricultural purposes, serving as a secondary continuous source of contamination to groundwater, serve as a direct exposure pathway to humans who may come into contact with the contaminated soil media (most significantly children who are most susceptible to health risks).

Soils that are contaminated provide a variety of exposure pathways to various receptors including but not limited to, humans, Livestock, including cattle, poultry, etc. These exposure pathways include, but are not limited to

- Dermal contact with contaminated soils;
- Incidental ingestion of contaminated soils;
- Ingestion of crops that are grown on contaminated soils;
- Inhalation of vapours from the hazardous wastes that are dumped on land

A case example for illustration is where hazardous wastes have been surreptitiously dumped outside plant facilities, and in close vicinity to residential areas. Children will get in touch with this contaminated media, farmers may harvest crops on these parcels of land, all of which cause an immediate exposure of the hazardous (which may be carcinogenic, mutagenic etc.) constituents to human receptors. In India, there are no comprehensive soil quality regulations and standards to ascertain the severity of contamination, however, internationally adopted standards can be applied selectively for setting screening and response levels for contaminated soils in the country.

The table below illustrates the typical source-pathway-receptor linkages that may exist in the event of soil being contamination by hazardous wastes.

Potential Source (primary and secondary)	Potential Exposure Pathways	Receptors		
		Human receptors Including Residents and Workers within the impacted area	Human receptors outside the impacted site, exposed indirectly	Indirect receptors such as cattle, flora, fauna
Soil impacted by Hazardous waste	Incidental ingestion or Dermal contact	✓	X	✓
	Inhalation of dust	✓	X	✓
	Inhalation of volatiles	✓	✓	✓

The impact on soil may further have associated impact on groundwater, surface water, flora, fauna, etc. which has been discussed in subsequent sections below.

3.2 Impacts on Groundwater

Aquifers being the source of vital element of life (drinking water), tend to be the most vulnerable and sensitive natural resources.

Typical examples of how aquifers are impacted with hazardous wastes include, but are not limited to:

- Leaching of contaminants from hazardous wastes dumped onto open parcels of land;
- Leaching of contaminants from hazardous waste storage tanks or leaking underground storage tanks;
- Leaching of contaminants from landfills that are leaking below ground;
- Reverse injection of liquid hazardous waste into deep injection wells;
- Leaching of contaminants from underground leaking pipelines carrying liquid hazardous waste

Typically for aquifers to get contaminated, overlying soils will tend to be contaminated first. Therefore, soil and groundwater contamination often occur simultaneously and are therefore assessed at the same time.

Contaminated aquifers provide a variety of exposure pathways to various receptors, including but not limited to, most importantly Humans, Livestock, including cattle, poultry, flora, fauna etc. These pathways include, but are not limited to

- Dermal contact with contaminated groundwater;
- Ingestion of contaminated groundwater by humans;
- Ingestion of contaminated groundwater by livestock and its potential bio-accumulation in the food chain;
- Ingestion of crops that are irrigated with contaminated groundwater;

Once a groundwater resource (aquifer) is contaminated, the contamination will migrate and spread in the direction of flow of the local/ regional groundwater. If not addressed early enough, and if the source of contamination is allowed to exist, large areas (regional scale) of the aquifer can easily get contaminated, thereby impacting various facets of life in a much larger area.

3.3 Impacts on Surface Water

Surface waters are a common affected natural resource due to illegal disposal or improper handling of hazardous wastes. Surface water, are a highly sensitive receptor in the Indian context (used for bathing purposes, washing purposes, irrigation purposes, in some cases drinking purposes etc.). As mentioned above, surface water bodies in India are used for a multitude of reasons by various human and ecological receptors, and therefore the risk of damage to the environment and human health is very high.

Typical examples of how surface water bodies are impacted with hazardous wastes include, but are not limited to:

- Runoff from hazardous waste dumps entering surface water bodies;
- Discharge of liquid hazardous waste directly into nearby streams or nalla's that ultimately discharge into larger surface water bodies;

Contaminated aquifers provide a variety of exposure pathways to various receptors, including but not limited to, most importantly Humans, Livestock, including cattle, poultry, flora, fauna etc. These pathways include, but are not limited to

- Dermal contact with contaminated surface water;
- Ingestion of contaminated surface water;
- Ingestion of contaminated surface water by livestock and its potential bio-accumulation in the food chain;
- Ingestion of aquatic species that live in contaminated surface waters; etc.

3.4 Impacts on Human Health

Hazardous waste spillage may cause direct effects that could potentially have a long term health impact on humans, long term impacts on flora and fauna, etc. Acute effects could include injury due to direct contact with hazardous waste or inhalation of noxious gases emanated from hazardous wastes. Loss of life may occur in rare cases due to improper handling or disposal of highly reactive wastes such as wastes containing reactive cyanide, reactive sulfide, long term exposure to wastes containing carcinogenic constituents, etc.

Indirect impacts on health may occur to human receptors from incidental ingestion of impacted soils (especially by children), consumption of vegetables grown on soil that is contaminated or irrigated with contaminated water, inhalation of vapors that migrate from contaminated soils/ aquifers into basements of buildings, drinking of contaminated groundwater etc

3.5 Impact on Flora and Fauna (Biodiversity)

Disposal of hazardous waste on open land may threaten species, populations or endangered ecological communities, or their habitats, known on the site or likely to occur in the locality of the site.

Examples of indirect and direct impacts that are common impacts to biodiversity include clearing/ fragmentation/alteration/destruction of native vegetation and animal habitats, pollution of watercourses and wetlands, sediment, nutrient and pollutant run-off into adjacent vegetation and animal habitats, loss of hollows, nesting and feeding habitats for birds, etc.

Indirect adverse effects on animals may occur from grazing on hazardous waste dumpsites, ingestion of plants grown on contaminated sites, dermal exposure to contaminated ground, drinking of surface water, etc. Contamination in surface water may affect aquatic flora and fauna.

3.6 Impact on Crops

Hazardous waste if disposed on crop lands may potentially change the characteristics of the soil being used for agricultural purposes thus resulting in reduction or total loss of yield of the crop and further indirect losses to livelihood. Spills of hazardous substances on land may cause negative impact on plant productivity depending on quantity and type of constituents. For example, Waste oil spills creates anaerobic conditions in the soil, coupled to water logging and acidic metabolites, the result is high accumulation of aluminum and manganese ions, which are toxic to plant growth. Soil contaminated with hazardous waste may affect mineral and organic matter content, and the geochemistry (e.g., the cation exchange capacity, redox properties) and physical properties (e.g., pH, electrical conductivity etc.) in soil.

3.7 Impact on Property

Accidental spillage of hazardous wastes may result into damage to the public buildings or private property. Adverse effects may include corrosion of structures/walls due to acid spillage, release of gaseous inside the basements of houses. Fires or explosion in incinerable hazardous waste may cause damage to adjoining properties.

4 ENVIRONMENTAL LIABILITY

Liability losses can be incurred through tort, contractual obligations, or violations of statutes. In addition to these traditional sources of liability, there is a unique legal aspect to environmental liability that makes these risks more difficult to manage. An environmental liability is a legal obligation to make a future expenditure due to the past or ongoing manufacture, use, release or threatened release of a particular substance or other activities that adversely affect the environment or human health. Environmental liability is required to be imposed retroactively with strict liability for clean-up costs as per the provisions under environmental protection Acts and Rules notified thereof.

The environmental liability is applicable for the actual environmental damages or alleged releases of pollutants that makes the responsible party obligated to pay for environmental remediation expenses. Environmental liabilities refer to the cleanup obligations and may also refer to potential for fines, penalties for violations of environmental laws.

Environmental liabilities arise from a variety of sources. A detailed list of environmental liabilities would be very lengthy; however, focusing on the environmental liabilities arising from handling and disposal of hazardous wastes, the following are the broad categories of environmental liabilities;

- Compliance obligations related to environmental regulations and Act/Rules that apply for generation, handling, storage, transportation, disposal etc. of hazardous wastes;
- Remediation obligations (existing and future) related to soil/groundwater/surface water contamination or air pollution that pose an environmental risk or potential risk to human health;
- Obligations to compensate the third parties for personal injury, property damage, and economic loss;
- Obligations to pay punitive damages for paying fines/penalties for gross negligence and criminal penalty for statutory or regulatory non-compliance; and
- Obligations to pay for natural resource damages.

The liabilities are applicable to the occupier, transporter, importer of hazardous waste or operator of a facility, as the case may be, referred as responsible party in this document. The liabilities for damages caused to the environment or third party arising due to improper handling, storage, transportation, disposal etc. of hazardous wastes as per the provisions under Rule 25(1) of Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008 have broadly been classified into the following:

a) Liability for taking up immediate measures

b) Liability for assessment of contamination

c) Liability for remediation of contaminated sites

d) Liability to pay for natural resource damages and compensation to the third parties for personal injury, property damage, and economic loss (i.e. compensation liability).

The principle of strict liability shall be exercised on the responsible party while implementing environment damage liabilities. Strict liability is the imposition of liability on the responsible party without finding a fault (such as negligence or tortious intent). In cases where two or more persons are liable in respect of same liability, the principle of "joint and several liability" shall be imposed. Under joint and several liability, a claimant may pursue an obligation against any one party as if they were jointly liable and it becomes responsibility of the defendants to sort out their respective proportions of liability and payment.

The obligations to pay punitive damages for paying fines/penalties for gross negligence and criminal penalty for statutory or regulatory non-compliance of the provisions under HWMH&TM) Rules, 2008 have been discussed under chapter "Enforcement of Penalty" of this document.

4.1 Liability for taking up immediate Emergency Response Plan Measures

The most possible scenarios that may occur while handling or disposal of hazardous waste are listed below.

i. Fire due to inflammable nature of hazardous wastes

ii. Explosion due to improper handling of hazardous waste

iii. Incompatible nature of waste, noxious, corrosive, toxic, poisonous, flammable and/ or fire takes place

iv. Leakages of hazardous gases from hazardous waste due to improper operation and / or installation problems

v. Spillages due to failure of piping systems (pipes, pumps, flanges, couplings, hoses, and valves) in handling of hazardous wastes

vi. Leakages or spillages due to external corrosion and structural failure of transporting or storage system (including landfills)

vii. Spills and overfills due to manual error

viii. Leaks or spillages during pumping of liquids or gases from truck or rail car to a storage tank or vice versa

ix. Spillages due to road accidents of trucks or tankers carrying hazardous waste

x. Illegal dumping insider outside the facilities of industries

xi. Spills or leakages due to flooding of hazardous waste containment

xii. Spills or leakages or fire due to hazardous material shifting

xiii. Spills/ leakages or fire due to other technical problems

xiv. Improper storage and disposal of hazardous waste

All occupier, transporter, operator or importer of hazardous waste, as the case may be, are liable for taking up immediate emergency response measures in the event of spillage, improper disposal, fire or mishandling of hazardous waste. The main objective of the emergency response measures is to secure immediate human & environmental safety and contain/control further spillage or release of hazardous waste or release of fumes/gases. Each occupier, transporter, operator or importer of hazardous waste, as the case may be, shall, therefore, develop their own Emergency Response Plan (ERP) in this regard for all

potential spillage/release/fire scenarios, which may vary case to case. Requisite basic safety equipment/ Personal Protective Equipment shall be made available at the site/transportation vehicle and concerned persons shall be trained in implementing ERP. Mock drill shall also be performed time to time.

As discussed above, the ERP may vary from one case to another. However, an ERP should address procedures for dealing with emergency situations and shall comprise the following, but not limited to:

- Containing and controlling incidents so as to minimise the effects and to limit danger to persons, the 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 they will be expected to perform;
- Arrangements for informing concerned authorities and emergency services; and
- Arrangements for providing assistance with off-site mitigatory action.

Detailed instructions shall be prescribed for evacuation, removal of the waste/contaminated substances to safe place, stabilisation, dilution to safe condition etc., wherever applicable. The ERP should be simple and straightforward, flexible and achieve necessary compliance with legislative requirements. Furthermore separate on-site and off-site ERP should be prepared.

Upon incidence, the responsible party shall immediately report the accident in the prescribed Form 14 along with relevant information to the concerned SPCB/PCC. The said Form 14 is given at Annexure III. Further, (i) the officer-in-charge of emergency or disaster relief operation of the district or other region of the state or Union territory specified by whatever designation by the Government of the said State or Union territory, and in whose jurisdiction the industry, process or operation is located; and (ii) the statutory authorities or agencies specified in column 3 in relation to places mentioned in column 2 against thereof of the Annexure I of this document, as applicable; shall also be intimated the fact of such occurrence or apprehension of such occurrence. Fire department, Police department, Hospitals etc. shall also be informed by the responsible party depending upon type of incidence and the emergency phone numbers of such shall be identified and be made available to the concerned person and emergency response team.

Removal of substance to safe place

The emergency spill control procedure should include the following key sections:

- Spills involving hazardous waste should first be contained to prevent spread of the material to other areas. This may involve the use of temporary diking, sand bags, dry sand, earth or proprietary booms / absorbent pads etc.;
- Wherever possible the waste/contaminated substances should be rendered safe by treating with appropriate chemicals (refer to stabilisation / dilution to safe condition given in succeeding paragraph);
- Waste/contaminated substances in a fine dusty form should not be cleared up by dry brushing. Vacuum cleaners should be used in preference, and for toxic materials one conforming to type H (BS 5415) should be used;
- Treated waste/contaminated substances should be absorbed onto inert carrier material to allow

the material to be cleared up and removed to a safe place for disposal or further treatment as appropriate;

- Waste should not be allowed to accumulate. A regular and frequent waste removal procedure should be adopted.

Stabilisation / dilution to safe condition

Once the hazardous waste has been contained to prevent spread of the material to other areas, the waste/ contaminated substances should be treated wherever possible to render it safe. Acidic and alkaline may be treated with appropriate neutralising agents. Due to the differing properties/characteristics of the various categories of hazardous waste, an appropriate treatment strategy with suitable chemicals should be established in each case. For example, highly concentrated spent acid bath will fume when spilled so prior to neutralisation the spill may be diluted with a water spray. However, such dilution shall be carried out preventing spread of diluted waste and emphasising minimal waste generation. Waste specific neutralizing substances/foam should readily be available, as part of the ERP.

Storage and Disposal of spilled waste/ treated waste/contaminated substances/contaminated water

Accumulation of spilled waste/ treated waste/contaminated substances/contaminated water shall not be allowed at the site for long periods. Arrangement shall be made to transport such wastes to secured storage facilities and transferring the same to authorised/permitted treatment and disposal facilities like common hazardous waste treatment, storage and disposal facilities for hazardous wastes or common effluent treatment plant. Inside an industry premise, an incidence may lead to abnormal loading on the effluent treatment plant/common treatment, storage and disposal facilities and in any such situation, the operators of such facilities are reported with suitable information so that appropriate arrangements/preparations can be adopted by them.

Initial Sampling

The responsible party shall carry out sampling of hazardous waste indulged in the incident and spilled/ spread waste at various suitable locations for analysis to identify constituents of concern. Samples of soil, surface water, sediment, ground water at appropriate locations, as the case may be, shall also be carried out which shall help in identifying impact. Wherever applicable, air quality monitoring shall also be carried out in upwind, down wind and source area. Responsible party shall submit a report on immediate response taken by them to SPCBs/PCCs within 48 hours of completion of immediate response measures.

Illegal dumping

In case of illegal dumping, the Regional offices of concerned SPCBs/PCC of a State/UT shall be made nodal agencies for inspection of incident sites, reporting to the officer-in-charge of emergency or disaster relief operation, Fire department, Police department, Hospitals etc. depending upon type of incidence. For this purpose, each SPCB shall identify a response team for each Regional Office and impart necessary training on dealing with the situations. Each regional office of SPCB shall maintain a minimum inventory of safety gadgets, spillage containing material & equipment, sampling tools etc or arrangement of an agency for dealing with such situations at any given time.

4.2 Liability for Assessment of Contamination

Note: For de-minimis environmental release situations (specifically, very small and localised spillages of hazardous wastes, cases of improper disposal of very small quantities of hazardous waste or minor fires involving hazardous wastes), wherein the resultant environmental impact or human health risk is deemed to

be very low in the judgement of either the District Magistrate and/ or Regional Officer of State Pollution Control Board, the Responsible Party may be held liable to take up only the immediate emergency response measures and if the same is completed in a satisfactory manner, may be exempted from undertaking detailed assessment or remediation works. It may be noted that the operative principle in all such situations shall be the potential for environmental impact or risk to human health and not simply the quantity of waste involved. As a starting point for further defining the de-minimis release criteria, it may be assumed that wherein the resultant environmental impact or human health risk is deemed to be very low in the judgement of District Magistrate and/ or Regional Officer of State Pollution Control Board, a release (accidental, negligent or otherwise) not exceeding 50 Litres of a liquid hazardous waste or 200 Kilograms of a solid hazardous waste may not necessarily trigger a requirement to undertake detailed assessments or remediation works. However, these criteria should be considered on a site specific basis, taking into consideration the type of contaminant (for example, the toxicity and exposure of waste), depth to groundwater table, sensitive receptors in the vicinity of the spill/ dump etc. It shall be considered that following the emergency response undertaken by the Responsible Party (specifically, very small and localised spillages of hazardous wastes, cases of improper disposal of very small quantities of hazardous waste or minor fires involving hazardous wastes), there shall still be a need to undertake a validation assessment to confirm that the entire contaminated mass has been removed and that natural resources (Soil, surface water and groundwater) are not impacted. In the event that the validation assessment indicates residual contamination in any of the environmental matrices, exceeding the nominated screening criteria (in the absence of an Indian specific criteria, alternative accepted criteria such as the Dutch Standards, Canadian Standards and/ or USEPA standards may be used), then the Responsible Party shall be held liable to undertake further assessment of contamination and remediation (if warranted) of the impacted area.

Example: A truck that is transporting hazardous wastes in bags, accidently drops a bag on the side of the highway. The authorities may consider case by case, that such small incidents (not exceeding the above mentioned trigger criteria), may only require an emergency response (i. e. pick up the wastes and the underlying soils and transport to the TSDF). However, it shall remain the responsibility of the Responsible Party to document and satisfy the regulatory authorities (SPCB/ PCC's) that the underlying soils and/ or other environmental media are not contaminated.

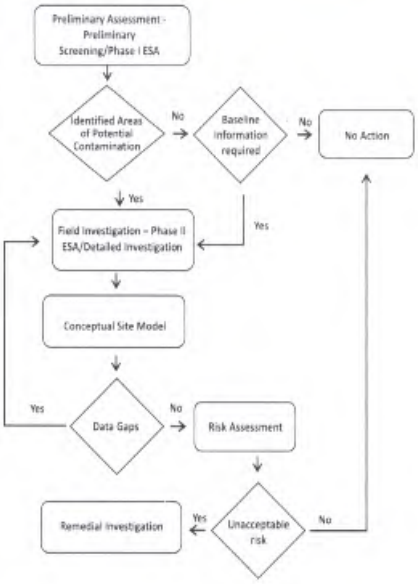
For events involving significant release of hazardous wastes into the environment, the following guidance shall be implemented by the Responsible Party:

(i) Upon occurrence of an incident, the Responsible Party shall initiate immediate response measures to minimize the environmental impacts as per the guidance laid down in Section 4.1 of this document.

(ii) The Responsible Party is liable to undertake environmental site assessment to characterise the extent of contamination. Such investigations shall be undertaken by engaging consultant(s) or organization having relevant experience. The said investigations shall also include risk to receptors and based on risk assessment study, various remedial plans shall be outlined.

(iii) A typical flow chart that may be considered in assessing whether a subject site is contributing to contamination of natural resources and posing a potential risk to the environment and human receptors is provided below.

(iv) The responsible party shall engage a well-established and experienced professional/ organisation to undertake Phase-I and Phase-II environmental site assessment, as given in subsequent paragraphs. As far as possible, the site assessment shall be carried out in line with locally applicable or – preferably - internationally accepted standards, like ASTM methods. The consultant shall have experience in the concerned industrial process or facility operations in which the incidence is reported.



Some of the key parameters that dictate the level of assessment are given below:

- Geology;
- Contaminant or Chemical of Concern;
- Carcinogenic or non-carcinogenic;
- Single contaminant (e.g., Chromium VI) or multiple contaminants (e.g., Chromium VI, Lead and Mercury), single class of contaminants (metals) or multiple class of contaminants (Metals, Benzene, Toluene and Polynuclear Aromatic Hydrocarbons);
- Impacted matrix (only soil, only groundwater, soil & groundwater, sediments, surface water, and combinations thereof);
- Current and future land use (industrial, commercial, agricultural, residential and combinations thereof);
- Offsite migration of contamination or localised to onsite impacts;
- Impacted receptors (drinking water receptors, agricultural fields, marine waters etc., and combinations thereof);
- Impacted media volumes;
- Duration of contamination;
- Free phase liquids in the case of volatile organic compounds and total petroleum hydrocarbons;

It is evident from the list above and the various potential combinations which make each site unique, initial investigation and assessment is of utmost importance and serve as a foundation for all further actions, penalties, remedial actions to be undertaken, liabilities to be assessed etc.

Phase I Environmental Site Assessment (ESA I)

The responsible party shall submit a Phase I Soil and Groundwater assessment report to the concerned SPCB/PCC within four (04) weeks from date of occurrence of the incidence. This Phase-I assessment report shall provide a description of the incident, land-use, geological and hydrogeological characterization and identify the potential for soil and/or groundwater contamination. This assessment includes limited sampling

and analysis of soil, groundwater and/or surface water samples to identify constituents of concern. Phase-I assessment shall include review of the following aspects;

- Relevant Permits and licenses issued to or held by the Responsible Party
- Site layout plans on suitable maps
- Details type of land use at which the incident occurred including historical use of the land
- Site vicinity/neighbours which may have active or suffer passive impact
- Site situation geographic (including climate conditions, surface waters, geology, hydrology, groundwater flow etc.)
- Cadastral information and ownership documents
- Details of surface water drainage, sewerage and nearby water bodies. Present and former underground structures, including sewers, drains, interceptors and storm water pipes.
- Impacts on air quality and discharge of effluent form incident site
- Presence of nearby wetlands
- Incident report (fires, spills, etc. due to hazardous waste handling)
- Historical maps, plans, photographs
- Records pertaining to generation, storage, transportation or handling of hazardous wastes
- Waste Management practices currently and in the past
- Details of site management, technical staff, employment history of persons involved in handling or management of hazardous wastes
- Neighbours and owners of adjacent properties, if relevant
- The location of the site in relation to sensitive receptors which could drive remedial liabilities shall be identified. Examples include potable water supplies, surface water bodies, sensitive ecosystems (i.e. wetlands), and residential housing location

All analysis of constituent parameters shall be analysed by laboratories accredited under EPA/NABL for those parameters.

In case, the ESA I report reveals non-exceedance of the nominated screening criteria (in the absence of an Indian specific criteria, alternative accepted criteria such as the Dutch Standards, Canadian Standards and/or USEPA standards may be used), then Phase II Environmental Site Assessment may not be required and neither risk assessment or remediation is warranted. However, decision on the same shall be taken by the respective SPCB/PCC of their own or constituting an expert committee thereof, wherein samples taken by the SPCB/PCC during the spill, leakages etc. shall also be taken into consideration.

Phase II Environmental Site Assessment (ESA II)

The purpose of a Phase II environmental site assessment is to build on ESA I findings by collecting soil, groundwater, surface water and sediment samples and chemical analysis data from Areas of Concern (AOCs) identified in the ESA I in order to determine if impacts are present that could pose a risk to human

health and the environment. The ESA II will also identify costs for obtaining ultimate goal to determine liabilities associated with remediation.

The exact number of intrusive soil and groundwater sampling points will be related to the size of the site, the findings from the ESA I and the overall potential for environmental risk .As a minimum, a ESA II shall include the following objectives, or scope of work items:

- Assessment of potential releases of hazardous waste and impact from such releases. Requisite sampling and analysis of soil, surface water, ground water etc., as applicable, shall be carried out in this regard.
- Media specific (soil, groundwater, surface water and sediment) analytical data shall be collected and analysed in an overall framework of identifying risks and potential pathways and receptors – i.e., direct contact and inhalation pathways for soil and groundwater, ingestion of groundwater, degradation of sensitive ecologies and acute risks (for example potential for spontaneous ignition or explosive decomposition) of hazardous constituents. Soil and groundwater sampling locations should be chosen not only to detect contaminated source areas but also to account for risk pathways toward identified receptors.
- Groundwater flow directions shall be derived and documented for the site, if impacts are known or suspected for groundwater. Both upstream (i.e. background) and downstream (i.e. leaving the site) groundwater quality shall be documented.
- Analysis of soil and groundwater samples shall utilize generally acceptable laboratory techniques (an appropriately certified lab) and include the suite of constituents (which consists of a comprehensive analysis of several groups or classes of constituents such as, but not limited to Metals, volatile organic compounds, semi-volatile organic compounds, petroleum hydrocarbons) for analysis that have been utilized on site particularly if these constituents could pose as a risk driver for damage to the environment and/ or human health.
- Analytical techniques should have method detection limits that are at least, lower than concentrations that could pose a risk (i.e. lower than screening values, intervention values etc.).
- All intrusive work should also include a Health and Safety Plan to ensure that safe practices are followed by personnel in the field, and a plan for dealing with emergencies is documented before any field work is initiated.
- Soil samples should be collected from the surface and from the vadose zone (i.e. above the water table). Screening techniques might be used to focus a subset of samples for laboratory analysis, thereby minimizing a large number of samples for broad analytical suites (i.e. PID screening, headspace analysis, use of NAPL indicator dyes, visual and olfactory observations, etc.).
- Groundwater samples should be collected from different depths to account for potential impacts in different aquifers and/or stratigraphic horizons. Well construction (whether temporary or permanent) should be consistent with the chosen standards and biased vertically to account for the presence of non-aqueous phase liquids if they are suspected (i.e. floating Light NAPLs or sinking Dense NAPLs).

The responsible party shall submit site assessment plan for ESA II along with the estimated cost for review/ approval by SPCB/PCC. The responsible party shall proceed for ESA II as per the approval from the concerned

SPCB/PCC followed by risk assessment and, as required, remediation plan.

Risk Assessment

Risk based approach for arriving at site-specific target or clean-up levels for an intended land use (which shall be decided by SPCBs/PCCs) shall be adopted. Assessment of human health risk is necessary to support the decision on arriving at site specific target levels for remediation.

Risk Assessment provides an evaluation of the potential threat to human health and the environment. It provides the basis for determining whether or not remedial action is necessary and the justification for performing remedial actions.

A tiered approach to Risk Assessment should be undertaken:

a) Generic Quantitative Risk Assessment (Tier 1 Risk Assessment) - Risk assessment is carried out after ESA II using generic assessment criteria based on local, regional or national screening criteria, international criterion such as Dutch intervention values or US EPA Regional Screening Level.

b) Site-specific Quantitative Risk Assessment (Tier 2 Risk Assessment) – A site specific assessment criteria shall be developed.

The major components of Risk Assessment are summarized below:

Contaminants – The first step in the Risk Assessment is to identify the type and constituent of concerns (COCs) present at the site as the level of risk posed by COCs is a function of type of contaminants, their impact on human health and environment, toxicity and their concentration at a site.

Receptors – The sensitive receptors to which the contamination at the site can reach are identified through receptor survey. Examples of receptors considered in the risk assessment include people (local residents, industrial employee, agricultural worker etc.), animals (cattle), properties (school, hospital etc.), water bodies (groundwater, surface water, etc.).

Exposure Pathways – The various pathways through which the contamination at the site can reach the identified sensitive receptors are determined though developing the Conceptual Site Model.

Components of Risk assessment

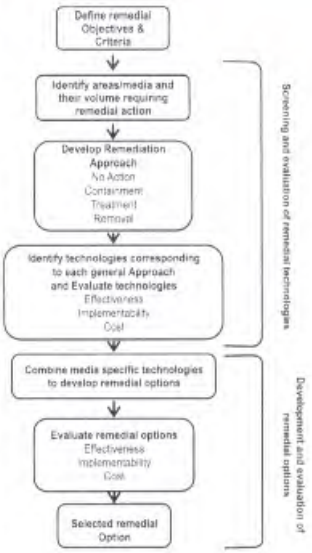
The responsible party shall submit their assessment report including ESA I and II reports, along with risk assessment report and, wherever applicable, remediation plan specifying remedial alternatives and selected remedial technologies, proposed Site Specific Targets Levels (SSTL) indicating remedial costs in executing remedial plan for approval of SPCBs/PCCs.

It is imperative that any assessment/ investigations undertaken by the responsible party should have a formal report with third party analytical reports. Any reports should also be reviewed and finally approved by SPCB/PCC or a third party auditor appointed by SPCB/PCC having expertise on the same.

4.3 Liability for Remediation of Contaminated Sites

Having completed the environmental site assessment (ESA I and II) and risk assessment, as above, the Responsible Party is also liable to undertake remediation activity, as applicable. With regard to selection

and implementation of remediation activity, the Responsible Party shall submit to SPCBs/PCCs a detailed report based on ESA I and ESA II along with risk assessment report, remediation plan specifying most applicable remedial technology to bring the site-specific contamination levels down to no risk or an accepted risk level (based on environment/ human health scenario) and estimated costs for remediation. Upon review of the same, the concerned SPCB/PCC shall fix and impose remediation objective and Site Specific Target Levels of requisite constituents of concerns along with intermediate target levels of each of the constituent vis-à-vis time schedule so as to monitor the progress of remediation in between also. Evaluation and fixation of the same may be carried out by the concerned SPCB/PCC of their own or by constituting Expert Committee thereof. An indicative approach for arriving at an appropriate remediation option is given in the flow sheet in this section.



Once the said remediation plan with site specific target levels is approved by the SPCBs/PCCS, responsible party shall undertake site remediation accordingly.

The key parameters that ultimately dictate the level and costs of remediation activities are same as identified for ESA i.e. ecology, CoCs, number of contaminants, Impact matrix, Current and intended future land use (industrial, commercial, agricultural, residential and combinations thereof), migration of contamination, Impacted receptors, Impacted media volumes, Free phase liquids etc.

4.4 Compensation Liability

In the cases where handling or disposal of hazardous waste has resulted into contamination that impacted appropriate loss to livelihood, health related effects and impacts or damages to third party etc.; the responsible party is liable to compensate for such losses by paying costs as decided by the District Magistrate or the concerned agency of the State/UT Govt., as the case may be. Compensations shall be applicable in case of loss of property, loss of crop, reduce yield of product, loss of life, hospitalization costs, loss of flora and fauna etc., resulting out of such handling or disposal of hazardous wastes.

The following compensations are envisaged, but not limited to;

a) Loss of property
b) Loss of crop
c) Reduce yield of product
d) Loss of life
e) Treatment cost towards human health impacts
f) Loss of flora and fauna (including cattle and livestock)

Contaminated natural resources (soil, groundwater, surface water and sediments) may have impacts on various receptors, which need to be addressed when dealing with the costs and liabilities that have to be allocated to the responsible party. These may include compensation for Loss of property, loss of crop, reduce yield of product, loss of life and hospitalization treatment cost; cost liability for compensating for damages caused to flora and fauna, etc.

It is not in the scope of this document to prescribe a detailed methodology for assessing aforesaid

compensation liability However, an indicative list of possible impacts and recovery measures which may help in assessing compensation liability is given in the following table:

Table-1 : Parameters for assessing indirect Compensation Liability

Indirect Impact	Environment	Economy	Society	Potential indirect impact (detail)	Possible recovery measure
Drinking water			×	Deterioration of the drinking water quality (groundwater, surface water) next to the site or in a distance from the site	Provide replacement drinking water supply, i.e. supplying through piping, tankers or provide treatment stations and develop monitoring systems. Potential liability cost depends on the extent of the impact and magnitude of the recovery measures
Ecology	×			Destruction/perturbation of fauna/flora species and habitats	Develop monitoring, protection and conservation systems
Agriculture		×	×	Loss of crops due to contamination or irrigation with contaminated water	Provide monetary compensation for the loss of crops, provide replacement irrigation systems, provide replacement lands
Infrastructures/ property	×	×	×	Disturbance or damage of public or private infrastructures (schools, roads, sewage, etc.), interruption of public services	Provide replacement infrastructures, repair damaged infrastructures, build new structures
Resettlement/ Relocation			×	Deterioration of the well-being of populations and living conditions due to adverse effects of the contamination	Definitive or temporary resettlement/relocation
Health			×	Disease, allergies, emotional and psychological effect	Provide monetary compensation, health structures and health monitoring program
Injury			×	Burns, toxic inhalation, physical impact by blast waves	Move the victim from the immediate area of fire, explosion, or spill (if this can be done without further injury to the victim or you). Locate nearest emergency eyewash or safety shower. Remove any contaminated clothing from the victim and flush all areas of the body contacted by chemical constituents with water. Provide first aid as appropriate and seek medical attention.
Loss of life			×	Death due to chemical spill or occurrence of fire	Provide monetary compensation, employment to the any one member of the family

Assessment of compensation liability and cost thereof for compensating the loss of livelihood, injury, treatment/hospitalization costs, loss of life, damage to property, damage to crop and reduced yield of crops may be imposed by the District Magistrate or the concerned agency of the State/UT Govt., as the case may be.

5 APPROACH FOR VALUATION OF LIABILITIES (IMMEDIATE RESPOSNE, SITE ASSESSMENT & REMEDIATION)

a) Upon receipt of information and site inspection, SPCBs/PCCs taking cognizance of a suspected impact to the environment and/or potential risk to human health, an immediate response liability of not less than INR 10,00,000/- may be levied upon the responsible party for the incident. This would capture only the cost of immediate response and Phase-I environmental assessment. Allocating a liability of INR 10,00,000/- may not mean that the responsible party has to pay this amount, but that he is liable to pay for this. This approach would be to encourage the responsible party to investigate on his own (through a third party auditor and appropriately validated by the regulator), the impacts to the environment/ human health that have occurred on his account. In case the immediate response is initiated by SPCBs / PCCs, the responsible party has a liability to pay two times the immediate response liability i.e. INR 20,00,000/- and interest as decided by the SPCB/PCC.

b) SPCBs/PCCs shall also impose legal and financial liability for undertaking ESA II, risk assessment and remediation work.

c) As described in Section 4.2, the scope of assessment varies largely depending on the constituent; extent of contamination, location, nature of physical setting, etc. and, therefore, it is not possible to derive a simplistic formula for allocating a financial liability for assessment on the responsible party. It is, therefore, recommended that initially, SPCBs/PCCs may include a minimum assessment liability of INR 20,00,000/- (in addition to the immediate response liability) which may be increased up to a maximum of INR 4,50,00,000/- depending on the type and extent of contamination. The indicative cost for assessment and remediation works as given in Table 2 may be referred. Further, in addition to assessment liability, SPCB/PCC may impose the remediation liability based on remediation technology and indicative costs thereof given in Table-2. The responsible party shall submit a bank-guarantee equivalent to the sum of liabilities for the assessment and remediation or for the amount as specified by SPCB/PCC. This however does not include compensatory liabilities that may still be present.

d) Upon finalization of remediation objective and SSTL, the responsible party may approach SPCBs/ PCCs for deduction of site assessment liabilities from the total liabilities imposed upon him in the form of bank guarantee.

e) In the event that the responsible party does not undertake any of the above actions, in spite of the SPCBs/PCCs directions, then SPCB shall undertake the immediate response, assessments and remediation work to the desired clean-up levels (in the larger interest of safe guarding the environment, public health and other relevant mandates under Central/State government regulations) and fix the liability for the same by imposing two to three times the costs incurred along with interest, as decided by the SPCB/PCC. This will serve as a deterrent for operators to follow the status quo of their contamination issue, and encourage them to act by themselves. Further, in case the responsible party does not respond, SPCBs/PCCs shall file FIR under Code of Criminal Procedure (CrPC) or approach National Green Tribunal or appropriate courts, as deemed fit, for initiating proceedings and recovery of the said amount from the responsible party along with the interest.

f) In the event that the responsible party is not traceable, then the SPCBs/PCCs may undertake the immediate response, assessments and remediation on their own or by engaging third party. In case funds are not available, they may approach respective State / UT Government for the same. Further, in such circumstances, FIR may be filed by SPCBs/PCCs under the Code of Criminal Procedure (CrPC) for necessary investigation and for identifying the responsible party and initiate recovery of liability equivalent to three times the cost incurred.

g) The occupier, transporter, importer or operator of a facility, may insure for an appropriate amount (depending on types of hazardous waste, quantum, possible impacts etc.) with insurance company to meet various environmental damage liabilities including compensation liability in the event of environmental damages due to handling and disposal of disposal of hazardous waste.

5.1 Indicative Cost of liabilities for Site Assessment and Remediation

It is to be noted that in the absence of any detailed database of sites having been assessed and remediated and the associated costs, a simplistic approach is adopted for assessing the cost of liabilities. Therefore the cost range will vary widely from case to case.

Liability for remediation cannot be calculated or judged without undertaking preliminary assessments and investigations. However, in order to aid the SPCBs/PCCs in setting a baseline yardstick with which they can hold the operator financially accountable, based on current Indian scenarios, a reasonable and worst case likely costs (or liability) estimations are possible. It is expected that the initial assessments and liability allocations, may be large, varying and at times inaccurate. Once a database of such liabilities is created, with more data, the ability to allocate these costs/ liabilities more precisely will increase. As a guidance tool and for indicative purposes, in order to assist the SPCB/ PCC's, a very broad order of magnitude cost matrix for allocating direct liability under some common Indian Hazardous Waste release scenarios has been presented in Table 2. It is emphasized that these costs are indicative in nature, will vary on a case to case basis, between different States, for different type of wastes, site physical setting, etc.

Table 2: Indicative cost for Site Assessment and Remediation

Scenario (onsite and offsite)	Site Assessment/ Risk Assessment		Remediation	
	Cost of liability (INR)	Notes	Cost of liability (INR)	Notes
Landfill breach and release of hazardous waste into environment	20,00,000 to 15,000,000	Costs can vary depending on volume of breach, whether the breach is above ground surface or below ground surface, whether the groundwater resources have been contaminated etc. Costs can vary in relation to the quantity of waste released, type of wastes, etc.	1,0000,000 to 250,000,000 and higher	Low range is applicable for basic excavation of above ground wastes and high range is applicable for situations where breach has occurred below ground contaminating groundwater resources. These complex situations of below ground breach can further be complicated and costly depending on the type of contaminant leaching into the groundwater, the sensitive receptors using that groundwater resource etc.

Scenario (onsite and offsite)	Site Assessment/ Risk Assessment		Remediation	
	Cost of liability (INR)	Notes	Cost of liability (INR)	Notes
Spillage of liquid hazardous waste due to transportation incident, including pipeline failures, spillage from drums, tanks etc also included	20,00,000 to 22,500,000	Costs can vary depending on what type of environmental receptors are located in the immediate spill vicinity (lake, river, stream, shallow potable groundwater aquifer, flora/ fauna, human receptors, etc.)	10000,000 to 200,000,000 and higher	Low costs may be applicable to sites where the groundwater table is very deep and the overlying strata is confining (example thick clay layer, competent rock with no weathering or fractures etc.). High costs may be applicable where the liquid hazardous waste immediately finds it to sensitive receptors including groundwater resources, surface water bodies used by humans, flora and fauna, etc.
Dumping of hazardous waste on open grounds without secondary containment	20,00,000 to 35,000,000	Costs will vary from a small dump (not exceeding 400 kg) to a large dump covering more than 100 m2 spatial extent (not considering the vertical depth). Costs will be higher for sites where groundwater table is shallow, where contaminants are carcinogenic, etc.	10000,000 to 250,000,000 and above.	
Costs less than 10,000,000 may be applicable to small volumes of less than 1 ton and immediate lifting and transportation to TSDF and not residual waste further contaminating the subsurface	Low costs may be applicable to sites where the groundwater table is very deep and the overlying strata is confining (example thick clay layer, competent rock with no weathering or fractures, etc.). High costs may be applicable where the liquid hazardous waste immediately finds it to sensitive receptors including groundwater resources, surface water bodies used by humans, flora and fauna, etc.			

Scenario (onsite and offsite)	Site Assessment/ Risk Assessment		Remediation	
	Cost of liability (INR)	Notes	Cost of liability (INR)	Notes
Improper handling and storage of hazardous waste	10,00,000 to 10,000,000	Low costs are applicable for small spatial impacts (less than 10,000 m2), whereas higher costs are for larger spatial impacts (greater than 10,000 m2). Costs will also vary depending upon the local site settings, geology, hydrogeology, etc.	5,000,000 to 75,000,000 and higher	Low costs may be applicable to sites where the groundwater table is very deep and the overlying strata is confining (example thick clay layer, competent rock with no weathering or fractures, etc). High costs may be applicable where the liquid hazardous waste immediately finds it to sensitive receptors including groundwater resources, surface water bodies used by humans, flora and fauna, etc. Costs are also dependent on the type of contaminant etc.
Fire incident leading to spillage of hazardous waste/ contaminated runoff water	20,00,000 to 10,000,000		10000,000 to 75,000,000 and higher	Low costs may be applicable to sites where the water runoff is low and contact with hazardous wastes has been minimal. Higher costs would be applicable to situations where large volume of contaminated runoff has migrated offsite, spills of hazardous wastes have occurred due to the fire, etc. The costs will also get magnified based on the local site settings, depth to groundwater etc.

Note: The factors that should be accounted for in estimating remediation liabilities based on the remediation technologies are given at Annexure-V. This Annexure may be referred by SPCBs/PCCs to estimate remediation liability.

6 ENFORCEMENT OF PENALTY

The Rule 25(2) of the Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008 stipulates that *"The occupier and the operator of the facility shall be liable to pay financial penalties as levied for any violation of the provisions under these rules by the State Pollution Control Board with the prior approval of the Central pollution Control Board."*

Section 15 of the Environment (Protection) Act, 1986, lays down provision for penalty for contravention of the provisions of the Act and the Rules, orders and directions issued thereunder. The same is reproduced as below:

15. PENALTY FOR CONTRAVENTION OF THE PROVISIONS OF THE ACT AND THE RULES, ORDERS AND DIRECTIONS

(1) Whoever fails to comply with or contravenes any of the provisions of this Act, or the rules made or orders or directions issued thereunder, shall, in respect of each such failure or contravention, be punishable with imprisonment for a term which may extend to five years with fine which may extend to one lakh rupees, or with both, and in case the failure or contravention continues, with additional fine which may extend to five thousand rupees for every day during which such failure or contravention continues after the conviction for the first such failure or contravention.

(2) If the failure or contravention referred to in sub-section (1) continues beyond a period of one year after the date of conviction, the offender shall be punishable with imprisonment for a term which may extend to seven years.

In view of above, financial penalty to be levied by the concerned SPCB/PCC for any violation may be limited to maximum of one lakh rupees per provision violated so as to ensure that levying of financial penalty remain within the brief of the Environment (Protection) Act, 1986, since the said Rules have been notified under the Environment (Protection) Act, 1986. However, non-compliance may attract violation of one or several provisions of the said Rules and thus the total financial penalty amount may be arrived by adding up number of provisions violated. Further, additional fine up to Rupees five thousand rupees for every day may also be imposed in case of failure continues by the responsible party beyond period by which remedial/corrective measures would have been implemented as suggested by the SPCB/PCC.

SPCBs/PCCs shall, therefore, send proposals of imposing financial penalty to be levied on defaulting party, as above, to CPCB for their approval. Such proposals shall include background and details of each and every violation of various provisions laid down under the Hazardous Waste (Management, Handling & Transboundary Movement) Rules, 2008, and financial penalty for each of such violations including the additional fine for continuing failures, wherever applicable. CPCB, upon examining the violations, may approve the same.

SPCB/PCC shall also ensure that case is filed in the court for invoking criminal case as stipulated under section 15 of the Environment (Protection) Act, 1986, especially in cases of gross violations of the provisions of the said Act/Rules.

7 ROLES OF STATE POLLUTION CONTROL BOARD / POLLUTION CONTROL COMMITTEE

(i) Every SPCB/PCC shall constitute an in-house team which may be named as "Hazardous Waste Incident Response Team" comprising officials having expertise in the field of hazardous waste management, soil, hydrogeology, water pollution, air pollution, and sampling/analysis. The objective of the aforesaid team shall be to collect all relevant data/samples/information which shall help in estimating/ implementing environmental damage liability and financial penalty. In case adequate analysis facility is not available with SPCB/PCC, an arrangement may be made with EPA/NABL accredited laboratory for this purpose to handle such situation at any given time. The team shall develop its own protocol for immediate response assigning role of each of the officials/laboratory personnel etc. like team leader, sampling equipment mobilization (such as hand held X-Ray Fluorescence (XRF) tool for metals, hand held Photo-Ionization Detector (PID)for VOCs, soil sampling tools, oil-water interface probe, water level meter, etc.), field reconnaissance, data/information collection, etc. The cost incurred in this regard shall be recovered from the responsible party.

(ii) In cases of receiving information about any illegal disposal of hazardous waste, that has occurred but not been reported by the responsible party, the concerned SPCBs/PCCs shall act immediately on receipt of such information as per the protocol identified in Section 4.1 of these guidelines.

(iii) The following data/samples/information (including but not limited to) may be collected by the said Hazardous Waste Incident Response Team:

(a) Basic information of incident as per format given in Annexure IV;

(b) Background and possible causes of incident;

(c) Estimated quantification of each of the affected media such as land, surface water, ground water, air quality, human population, flora, fauna, third party properties, etc. in terms of area (m2), volume (m3), numbers, percentage etc., as applicable and possible. In case air quality is affected, the same may be reported based on physical observation in terms of area and population under direct impact, physical observation on air quality etc.;

(d) Collection of hazardous waste samples (minimum 03 samples at different location) indulged in the incident for characterisation and analysis of parameters of concern (w.r.t. impacts/ contamination to land/surface water/ ground water etc.) based on preliminary investigation;

(e) Minimum 03 samples each of soil, surface water, sediment, ground water, ambient air etc., as the case may be, at different locations of affected areas as per the judgement of the Hazardous Waste Incident Response Team. However, more number of samples may be required depending on nature of incidence/site conditions;

(f) Sampling of atleast one sample in unaffected area/up-gradient, as the case may be, of soil, surface water, sediment, ground water, ambient air etc. for comparison of contamination/ impacts and estimating liability;

(g) Total number of provisions of the HWM Rules, 2008 and conditions of authorisation granted by the concerned SPCB/PCC that violated in the said incident with elaboration of each of such violations. The same shall help in estimating/ implementing the financial penalty, and;

(h) Note on emergency measures taken by responsible party to alleviate the effect of incident.

More samples/data/information may require to be taken depending upon nature of incidence and site conditions.

(iv) The Hazardous Waste Incident Response Team shall also co-ordinate with the officer-in-charge of emergency or disaster relief operation of the district or other region of a state or Union territory specified by whatever designation by the Government of the said State or Union territory, and in whose jurisdiction the industry, process or operation is located. It shall also co-ordinate with the statutory authorities or agencies, as the case may be, specified in column 3 in relation to places mentioned in column 2 against thereof of the Annexure I of this guidelines.

(v) Based on the report of the Hazardous Waste Incident Response Team and accident reporting (submitted by the responsible party), the SPCB/PCC shall ensure that the immediate response measures are taken by the responsible party to contain further environmental damage. In case the said measures are not being taken by the responsible party adequately, SPCB/PCC shall undertake such measures on its own or engaging a third party and two times the amount incurred in this regard along with interest shall be recovered from the responsible party as immediate response liability (as part of direct liability).

(vi) The SPCB/PCC shall obtain bank guarantee, equivalent to estimated assessment (including risk assessment) and remediation cost liabilities or for the amount as decided by SPCB/PCC, from the responsible party as early as possible but not later than three weeks from day of the incidence. The cost in this regard may be estimated separately (i.e. for assessment and remediation work) by the SPCB/PCC on case to case basis. However, an indicative cost in this regard is given in Section 5.1 which may be helpful.

(vii) SPCB/PCC shall ensure that ESA I report is received from the responsible party within four weeks of the incidence and shall impose ESA II activity, wherever required, also taking into account of data/information/sampling results provided by the Hazardous Waste Incident Response Team. Upon receipt of sampling (ESA II) and assessment plan by the responsible party along with the estimated cost, the SPCB/PCC shall examine the same. SPCB/PCC may approve the same by modifying or adding to the scope of the said sampling and assessment plan, if required.

The approval of the aforesaid plan, including risk assessment, shall be accorded by the SPCB/PCC to the responsible party and the work of assessment thereof shall be monitored by the SPCB/PCC.

Upon receipt of the assessment report, which shall also comprise of risk assessment, proposed remediation objective and remediation plans along with the cost and time schedule, SPCB/PCC shall examine the same and set remediation objective/standard. If required, SPCB/PCC may ask the responsible party to submit any alternate remediation plan along with cost which has not been given in the said assessment report. The approved remediation objective/standard shall be executed by the responsible party which shall be monitored by SPCB/PCC as per the time schedules and phase wise concentration targets thereof as declared in the assessment report so as to meet the said remediation objective/standard. During such monitoring, few sampling and analysis thereof shall also be carried out by the SPCB/PCC for validation.

Upon satisfactory completion of sampling and assessment work and acceptance of the same along with

finalization of remediation objective and remediation plan and cost thereof, the SPCB/PCC may return the part of bank guarantee retaining the said remediation cost. In case submitted bank guarantee value is lesser than estimated remediation cost or the amount specified by SPCB/PCC, the responsible party shall submit additional bank guarantee within a stipulated time.

(viii) Upon satisfactory completion and validation of the remediation objective and standards (SSTL), SPCB/PCC may return the remaining bank guarantee submitted by the responsible party.

(ix) For examining the assessment report, setting remediation objectives/standards, remediation plan and closure reports, SPCB/PCC may carry out the same of their own or constituting an expert committee thereof. Further, to monitor work of assessment and remediation, SPCB may engage a consultant having experience in the field of contaminated site remediation. The cost incurred in this regard shall be paid to SPCB/PCC by the responsible party.

(x) In case the responsible party fails to undertake timely assessment and remediation work, SPCB/PCC shall carry out the same of its own or by engaging a consultant/contractor. In such case, SPCB/PCC shall impose liability equivalent to two times the cost incurred on the same to the responsible party. The said liability amount shall be recovered with interest as applicable. Further, in case the responsible party does not respond, SPCBs/PCCs shall file FIR under Code of Criminal Procedure (CrPC) or approach National Green Tribunal or appropriate courts, as deemed fit, for initiating proceedings and recovery of the said amount from the responsible party.

(xi) In the event that the responsible party is not traceable, then the SPCBs/PCCs may undertake the immediate response, assessments and remediation on their own or by engaging third party. In case funds are not available, they may approach respective State / UT Government for the same. Further, in such circumstances, FIR may be filed by SPCBs/PCCs under the Code of Criminal Procedure (CrPC) for necessary investigation and for identifying the responsible party and initiate recovery of liability equivalent to three times the cost incurred.

(xii) For imposing rate of interest on liability amount to be recovered from the date when the same is raised, SPCB/PCC shall ensure that such rate of interest is fixed by the Government through order in compliance with the provisions stipulated under section 9 of the Environment (Protection) Act, 1986.

(xiii) SPCB/PCC shall impose following conditions in the existing and new authorisation issued to the occupier, transporter, importer or operator of a facility under the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008:

(a) Evolve and implement Emergency Response Plan (ERP) for hazardous wastes for which this authorisation is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts. Mock drill in this regard shall be carried out at regular interval of time; and

(b) Provisions outlined in these guidelines shall be followed by the unit/person, whom authorisation is hereby granted.

A declaration on non-judicial stamp paper shall be obtained from authorised person/unit that they will follow all provisions including the scope of submitting bank guarantee stipulated in this guidelines in the

event of spillage, leakage or fire while handling hazardous waste by them. All new authorisations shall be granted only after obtaining the said declaration on non-judicial stamp paper.

For ease in implementing environmental damage liability on responsible party, all SPCBs/PCCs may pursue with respective Government for delegation of power to the SPCB/PCC for recovering amount, as mentioned in this document, as land revenue from the responsible party in case immediate response/ site assessment/ risk assessment/ remediation work, as applicable, is carried out by the SPCB/PCC.

Annexure I

The Environment (Protection) Rules, 1986

[SCHEDULE V]

(See rule 12)

S.No	Place at which the discharge of any environmental Pollutant in excess of prescribed standards occurs or is apprehended to occur	Authorities or agencies to be intimated	Appointed under
	2	3	4
1	Factories as defined under the factories Act, 1948		
	(a) owned by Central Government and engaged in carrying out the purposes of the Atomic Energy Act; 1962;	I. the atomic energy regulatory Board (AERB)	The Atomic Energy Act, 1962
		II. The Ministry of Environment and forests.	
	(b) Factories other than those mentioned in paragraph (a)	I. The chief Inspector of Factories.	
2.	Mine as defined under the Mines and Minerals (Regulation and Development) Act, 1957	II. The Inspector of Factories having local jurisdiction.	The Factories Act, 1948.
		III. The Ministry of Environment and Forests.	-do-
3.	Port as defined under the Indian Ports Act, 1908	I. Conservator of Ports	The Indian Ports Act, 1908
		II. The Ministry of Environment & Forests	-
4.	Plantations as defined under the Plantations Labour Act, 1951	I. The Chief Inspector of Plantations.	The Plantations Labour Act, 1951
		II. The Inspector of Plantation having local jurisdiction.	-
		III. the Ministry of Environment & Forests.	-

5.	Motor Vehicles as defined under the Motor Vehicles Act, 1939	I. State Transport Authority	The Motor Vehicles Act, 1939
		II. Regional Transport Authority having regional jurisdiction.	
		III. The Ministry of Environment & Forests	
6.	Ship as defined under the Merchant Shipping Act, 1958	I. Director General of Shipping	The Merchant Shipping Act, 1958
		II. Surveyor having jurisdiction.	-do-
		III. The Ministry of Environment & Forests.	

1 Schedule II relating to rule 12 re-numbered as Schedule V vide G.S.R. 422 (E) dated 19.05.1993, published in the Gazette No. 174 dated 19.05.1993.

Annexure II

Schedule II [See Sections 15(4) and 17(1)] Heads under Which Compensation or Relief for Damage May Be Claimed

a. Death;

b. Permanent, temporary, total or partial disability or other injury or sickness;

c. Loss of wages due to total or partial disability or permanent or temporary disability;

d. Medical expenses incurred for treatment of injuries or sickness;

e. Damages to private property;

f. Expenses incurred by the Government or any local authority in providing relief, aid and rehabilitation to the affected persons;

g. Expenses incurred by the Government for any administrative or legal action or to cope with any harm or damage, including compensation for environmental degradation and restoration of the quality of environment;

h. Loss to the Government or local authority arising out of, or connected with, the activity causing any damage;

i. Claims on account of any harm, damage or destruction to the fauna including milch and draught animals and aquatic fauna;

j. Claims on account of any harm, damage or destruction to flora including aquatic flora, crops, vegetables, trees and orchards;

k. Claims including cost of restoration on account of any harm or damage to environment including pollution of soil, air, water, land and eco-systems;

l. Loss and destruction of any property other than private property;

m. Loss of business or employment or both;

n. Any other claim arising out of, or connected with, any activity of handling of hazardous substance.

Annexure III

Form 14

(See rule 24)

FORMAT OF ACCIDENT REPORT

[To be submitted by the occupier or operator of a facility and the transporter to the SPCB/PCC]

1. The date and time of the accident. :
2. Sequence of events leading to accident. :
3. The hazardous waste involvement 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 taken to prevent the recurrence of such an accident :

Place: **Signature:**

Date: **Designation**

Annexure IV

ENVIRONMENT POLLUTION INCIDENT REPORT

INCIDENT REPORTED BY (NAME): ORGANISATION/ AGENCY:
CONTACT No.:

INCIDENT LOCATION:

RESPONSIBLE PARTY'S NAME: PHONE & ADDRESS:

HAZARDOUS WASTE INVOLVED

FORM: SOLID ☐ TARRY ☐ SLURRY ☐ LIQUID ☐ OTHERS(Please Specify) ☐

QUANTITY OF HAZARDOUS WASTE INDULGED:

CHARACTERISTICS OF HAZARDOUS WASTE INDULGED:

EXPLOSIVE ☐ CORROSIVE ☐ TOXIC ☐ FLAMMABLE ☐

OTHER(Please Specify) ☐

SOURCE OF HAZARDOUS WASTE INDULGED:

NAME OF HAZARDOUS WASTE INDULGED (INCLUDING COMMON & TRADE NAME):

CATEGORY AS PER THE SCHEDULE OF THE HWM RULES, 2008:

DATE/TIME INCIDENT OCCURRED:

TYPE OF INCIDENT: FIRE ☐ ACCIDENT ☐ SPILLAGES ☐ BREACH OF CONTAINMENT ☐

OTHER(Please Specify) ☐

DURATION OF TIME:

MEDIA POSSIBLY AFFECTED: AIR ☐ GROUND WATER ☐ SOIL ☐ SURFACE WATER ☐

SUSPECTED LOSS OF AQUATIC LIFE: Yes ☐ No ☐

TOP SOIL CHARACTERISTIC IN THE AREA BASED ON PHYSICAL APPEARANCE (silty, clayey, sandy, etc.) :

AQUIFER CHARACTERISTICS: LOCAL POPULATION IN THE VICINITY:

SITUATION DESCRIPTION: Below points may be answered, if possible, in addition to any other information that might be available)

GEOLOGY TYPE: (Sand, Clay, Silt, Weathered rock, fracture rock, competent rock)

DEPTH TO GROUNDWATER: (M BELOW GROUND SURFACE)

GROUNDWATER USAGE IN VICINITY: (Drinking, agricultural, bathing, washing, industrial use)

GROUNDWATER VULNERABILITY : (Likelihood of contaminants reaching the groundwater)

GROUNDWATER SENSITIVITY: (potential significance of any impact)

OTHER WATER RESOURCES VULNERABILITY & SENSITIVITY:

RECEPTORS IN VICINITY: (Residential, industrial, agricultural, marine life, wetlands, etc)

CONDITION

LEAKAGE ☐ LEAKING ☐ FIRE ☐ ACCIDENT ☐ SPILLAGES ☐ OVERFILL ILLEGAL ☐ DUMP ☐

ANY OTHER, PLEASE SPECIFY: ☐

EVACUATION CONDUCTED: Yes ☐ No ☐ IF YES, AT WHAT DISTANCE:

HUMAN INJURIES: Yes ☐ No ☐ IF YES, HOW MANY AND WHAT TYPE:

HUMAN CASUALTY: Yes ☐ No ☐ IF YES, HOW MANY:

EXTENT OF SPILLAGE/FIRE/ACCIDENT:

POSSIBLE SCENARIOS

FIRE DUE TO INFLAMMABLE NATURE OF HAZARDOUS WASTE ☐ EXPLOSION DUE TO IMPROPER HANDLING ☐

FIRE/EXPLOSION DUE TO INCOMPATIBLE NATURE OF HAZARDOUS WASTE ☐ LEAKAGES/SPILLAGES DUE TO CORROSION ☐

SPILLAGES DUE TO FAILURE OF PIPING SYSTEMS ☐ LEAKAGES/SPILLAGES DURING TRANSFER OF HAZARDOUS WASTES ☐

SPILLS/OVERFILLS DUE TO MANUAL ERROR ☐ SPILLS/FIRE DUE TO ACCIDENTS ☐ ILLEGAL DUMPING ☐

SPILLS/LEAKAGES DUE TO FLOODING OF HAZARDOUS WASTE CONTAINMENTS ☐ IMPROPER STORAGE/DISPOSAL ☐

SPILLS/LEAKAGES/FIRE DUE TO TECHNICAL ERROR ☐ LEAKAGE OF HAZARDOUS WASTE LANDFILL PRESENT ON-SITE ☐

ANY OTHER, PLEASE SPECIFY:

ANY KNOWN OR ANTICIPATED RISK:

COMMENTS/REMARKS:

DATE:	**TIME:**	**INITALS:**	**HAZARDOUS CLASS:**

NAME & DESIGNATION OF THE OFFICIAL REPORTING THE INCIDENT:

TELEPHONE #:

SIGNATURE:

Annexure V

Factors to be accounted for estimating liability for remediation of soil, groundwater, surface water and sediment contaminate sites based on the remediation technologies

Note: Considering large number of parameters that ultimately dictate the liability and costs for clean-up to the recommended levels, it is currently not possible to generate a complete table with exact costs. Each case/ site is unique in itself as each site has very different key critical parameters, each of which has a different weightage in terms of gravity or impact.

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
In- Situ Biological Treatments for Soil and Sediment Contaminated Sites				
1.	**Bioventing** Oxygen is delivered to contaminated unsaturated soils by forced air movement (either extraction or injection of air) to increase oxygen concentrations and stimulate biodegradation.	Bioventing techniques have been successfully used to remediate soils contaminated by petroleum hydrocarbons, nonchlorinated solvents, some pesticides, wood preservatives, and other organic chemicals.	Key Cost Drivers 1) Surface area is the primary cost driver Impacts the number of injection/extraction wells that are installed. The number of wells installed (and cost) increases with surface area. 2) Soil containing sand and gravel produced significantly lower costs by reducing the number of injection/extraction wells that needed to be installed. 3) Other factors include contaminant type and concentration, soil permeability, well spacing and number, pumping rate, and off-gas treatment. This technology does not require expensive equipment and relatively few personnel are involved in the operation and maintenance of a bioventing system. Periodic maintenance monitoring is conducted.	1. Low degree of Operation & Maintenance (O&M) intensity 2. Low degree of capital investment 3. High reliability & low maintenance 4. Low degree of general costs

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
2.	**Bioremediation** The activity of naturally occurring microbes is stimulated by circulating water-based solutions through contaminated soils to enhance in situ biological degradation of organic contaminants or immobilization of inorganic contaminants. Nutrients, oxygen, or other amendments may be used to enhance bioremediation and contaminant desorption from subsurface materials.	Bioremediation techniques have been successfully used to remediate soils, sludges, and ground water contaminated with petroleum hydrocarbons, solvents, pesticides, wood preservatives, and other organic chemicals	Factors that affect cost include the soil type and chemistry, type and quantity of amendments used, and type and extent of contamination	1. High degree of Operation & Maintenance (O&M) intensity 2. Average degree of capital investment 3. Average reliability & low maintenance 4. Low degree of general costs
3.	**Phytoremediation** Phytoremediation is a process that uses plants to remove, transfer, stabilize, and destroy contaminants in soil and sediment. Contaminants may be either organic or inorganic.	Phytoremediation may be applicable for the remediation of metals, pesticides, solvents, explosives, crude oil, PAHs, and landfill leachates	Key Cost Drivers 1) Scale of effort Area of contamination is the primary cost driver 2) Density of sampling Primary cost driver of sampling cost; may be directed by regulatory requirements.	1. Low degree of Operation & Maintenance (O&M) intensity 2. Low degree of capital investment 3. Low reliability & low maintenance 4. Low degree of general costs
n- Situ Physical/Chemical Treatments for Soil and Sediment Contaminated Sites				
4.	**Chemical Oxidation** Oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. The oxidizing agents most commonly used are ozone, hydrogen peroxide, hypochlorites, chlorine, and chlorine dioxide.		Data can be gathered from Chemical Oxidation for Groundwater	1. High degree of Operation & Maintenance (O&M) intensity 2. Average degree of capital investment 3. Average reliability & low maintenance 4. Average degree of general costs

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
5.	**Soil Vapor Extraction** Vacuum is applied through extraction wells to create a pressure/concentration gradient that induces gas-phase volatiles to be removed from soil through extraction wells. This technology also is known as in situ soil venting, in situ volatilization, enhanced volatilization, or soil vacuum extraction.	The target contaminant groups for in situ SVE are VOCs and some fuels. The technology is typically applicable only to volatile compounds with a Henry's law constant greater than 0.01 or a vapor pressure greater than 0.5 mm Hg (0.02 inches Hg). Other factors, such as the moisture content, organic content, and air permeability of the soil, will also affect in situ SVE's effectiveness.	Key Cost Drivers 1) Economy of Scale Quantity of material treated has a large impact 2) Soil Type Based on the number of wells required 3) Can be radically different if no airflow treatment is required 4) The cost of in situ SVE is site-specific, depending on the size of the site, the nature and amount of contamination, and the hydrogeological setting (EPA, July 1989). These factors affect the number of wells, the blower capacity and vacuum level required, and the length of time required to remediate the site. A requirement for off-gas treatment adds significantly to the cost. Water is also frequently extracted during the process and usually requires treatment prior to disposal, further adding to the cost.	1. High degree of Operation & Maintenance (O&M) intensity 2. Average degree of capital investment 3. High reliability & low maintenance 4. Low degree of general costs
6.	**Solidification/ Stabilization** Contaminants are physically bound or enclosed within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization).	The target contaminant group for in situ Solidification/Stabilization is generally inorganics (including radionuclides).	Costs for Solidification/ Stabilization processes vary widely according to materials or reagents used, their availability, project size, and chemical nature of contaminants (e.g., types and concentration levels for shallow applications). The major factor driving the selection process beyond basic waste compatibility is the availability of suitable reagents	1. Average degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. Low degree of general costs
In- Situ Thermal Treatment for Soil and Sediment Contaminated Sites				

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
7.	**Thermal Treatment** Steam/hot air injection or electrical resistance/ electromagnetic/fiber optic/radio frequency heating is used to increase the volatilization rate of semi-volatiles and facilitate extraction.	High moisture content is a limitation of standard SVE that thermally enhancement may help overcome. Heating, especially radio frequency heating and electrical resistance heating can improve air flow in high moisture soils by evaporating water. The system is designed to treat SVOCs but will consequently treat VOCs. Thermally enhanced SVE technologies also are effective in treating some pesticides and fuels, depending on the temperatures achieved by the system.	Key Cost Drivers 1) Soil Type The primary cost driver is soil type, which once again determines soil permeability. For thermal treatment, soils of lower permeability (silts/silty-clays) are less expensive to remediate as they require less gas flow. 2) Depth to Top/Thickness of Contaminated Area The secondary cost drivers are depth to the top and thickness of the contaminated zone. A deeper and thicker region of contaminated soils has higher remedial costs	1. High degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. Average degree of general costs
Ex- Situ Biological Treatment for Soil and Sediment Contaminated Sites (assuming excavation)				
8.	**Biopiles** Excavated soils are mixed with soil amendments and placed in aboveground enclosures. It is an aerated static pile composting process in which compost is formed into piles and aerated with blowers or vacuum pumps	Biopile treatment has been applied to treatment of nonhalogenated VOCs and fuel hydrocarbons. Halogenated VOCs, SVOCs, and pesticides also can be treated, but the process effectiveness will vary and may be applicable only to some compounds within these contaminant groups.	Costs are dependent on the contaminant, procedure to be used, need for additional pre- and post-treatment, and need for air emission control equipment. Biopiles are relatively simple and require few personnel for operation and maintenance.	1. Low degree of Operation & Maintenance (O&M) intensity 2. Low degree of capital investment 3. High reliability & low maintenance 4. Low degree of general costs
Ex- Situ Physical/Chemical Treatments for Soil and Sediment Contaminated Sites (assuming excavation)				
9.	**Chemical Reduction/ Oxidation** Reduction/oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. The oxidizing agents most commonly used are ozone, hydrogen peroxide, hypochlorites, chlorine, and chlorine dioxide.			

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
10.	**Soil Washing** Contaminants sorbed onto fine soil particles are separated from bulk soil in an aqueous-based system on the basis of particle size. The wash water may be augmented with a basic leaching agent, surfactant, pH adjustment, or chelating agent to help remove organics and heavy metals.	The target contaminant groups for soil washing are SVOCs, fuels, and heavy metals. The technology can be used on selected VOCs and pesticides. The technology offers the ability for recovery of metals and can clean a wide range of organic and inorganic contaminants from coarse-grained soils.	Key Cost Drivers 1) Economy of Scale Quantity of material treated has a large impact 2) Processor speed Also depends on the amount of waste being processed	1. High degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. Average degree of general costs
11.	**Solidification/ Stabilization** Contaminants are physically bound or enclosed within a stabilized mass (solidification), or chemical reactions are induced between the stabilizing agent and contaminants to reduce their mobility (stabilization).	The target contaminant group for ex situ S/S is inorganics, including radionuclides. Most S/S technologies have limited effectiveness against organics and pesticides, except vitrification which destroys most organic contaminants	Key Cost Drivers 1) Type of Waste Moisture content in the sludge drives up costs compared to solid Contaminant concentration and type determine the amount of reagents added to the waste to attain the required treatment standards 2) Size of the mobile s/s system Choosing the correct size mobile s/s system to adequately handle the throughput of waste volume	1. Average degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. Low degree of general costs
Ex- Situ Thermal Treatments for Soil and Sediment Contaminated Sites (assuming excavation)				
12	**Incineration** High temperatures, 870-1,200 °C, are used to combust (in the presence of oxygen) organic constituents in hazardous wastes	Incineration is used to remediate soils contaminated with explosives and hazardous wastes, particularly chlorinated hydrocarbons, PCBs, and dioxins.	Key Cost Drivers 1) Type of waste Debris < Soil < Sludge < Sediment 2) Quantity There is only a INR 18000 - INR 24000 gap in cost for quantities ranging from 5,000 – 100,000.	1. High degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. Average reliability & low maintenance 4. High degree of general costs

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
13	**Thermal Desorption** Wastes are heated to volatilize water and organic contaminants. A carrier gas or vacuum system transports volatilized water and organics to the gas treatment system.	Thermal desorption systems have varying degrees of effectiveness against the full spectrum of organic contaminants. The target contaminant groups for Low Temperature Thermal Desorption (LTTD) systems are nonhalogenated VOCs and fuels. The technology can be used to treat SVOCs at reduced effectiveness. The target contaminants for High Temperature Thermal Desorption (LTTD) are SVOCs, PAHs, PCBs, and pesticides; however, VOCs and fuels also may be treated, but treatment may be less cost-effective.	Key Cost Drivers 1) Economy of Scale Quantity of material treated has a large impact 2)Moisture content Increases required heat input (increasing fuel costs)	1. High degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. Average reliability & low maintenance 4. Average degree of general costs
Containment for Soil and Sediment Contaminated Sites				
14.	**Landfill Cap** Landfill caps are used for contaminant source control.	Landfill Caps may be temporary or final. Temporary caps can be installed before final closure to minimize generation of leachate until a better remedy is selected. They are usually used to minimize infiltration when the underlying waste mass is undergoing settling. A more stable base will thus be provided for the final cover, reducing the cost of the post-closure maintenance. Landfill caps also may be applied to waste masses that are so large that other treatment is impractical.	Landfill caps are generally the least expensive way to manage the human health and ecological risks effectively	1. Average degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. Low degree of general costs
Other Treatment for Soil and Sediment Contaminated Sites				
15.	**Excavation, Retrieval, and Off-Site Disposal** Contaminated material is removed and transported to permitted off-site treatment and disposal facilities. Pretreatment may be required.	Excavation and off-site disposal is applicable to the complete range of contaminant groups with no particular target group. Excavation and off-site by relocating the waste to a different (and presumably safer) site	These estimates include excavation/removal, transportation. and disposal at an authorized TSDF. Additional cost of treatment at disposal facility may also be required. Excavation and off-site disposal is a relatively simple	1. Low degree of Operation & Maintenance (O&M) intensity 2. Low degree of capital investment 3. High reliability & low maintenance

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
			process, with proven procedures. It is a labor-intensive practice with little potential for further automation. Additional costs may include soil characterization and treatment to meet land ban requirements.	
In- Situ Biological Treatments for Groundwater and Surface Water Contaminated Sites				
16.	**Bioremediation** The rate of bioremediation of organic contaminants by microbes is enhanced by increasing the concentration of electron acceptors and nutrients in ground water, surface water, and leachate. Oxygen is the main electron acceptor for aerobic bioremediation. Nitrate serves as an alternative electron acceptor under anoxic conditions.	Target contaminants for enhanced biodegradation processes are nonhalogenated VOCs, nonhalogenated SVOCs, and fuels. Pesticides also should have limited treatability. Nitrate enhancement has primarily been used to remediate ground water contaminated by BTEX.	Variables affecting the cost are the nature and depth of the contaminants, use of bioaugmentation and/or hydrogen peroxide or nitrate addition, and ground water pumping rates.	1. High degree of Operation & Maintenance (O&M) intensity 2. Average degree of capital investment 3. Average reliability & low maintenance 4. Low degree of general costs
17.	**Monitored Natural Attenuation** Natural subsurface processes—such as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials—are allowed to reduce contaminant concentrations to acceptable levels.	Target contaminants for natural attenuation are VOCs and SVOCs and fuel hydrocarbons. Fuel and halogenated VOCs are commonly evaluated for natural attenuation. Pesticides also can be allowed to naturally attenuate, but the process may be less effective and may be applicable to only some compounds within the group.	There are costs for modeling and monitoring. Modeling determines whether natural attenuation is a feasible remedial alternative. The most significant costs associated with natural attenuation are most often due to monitoring requirements, which include two major parts - site characterization and performance monitoring. Site characterization determines the extent of contamination and contaminant degradation rates. Performance monitoring tracks down contaminants migration and degradation and cleanup status	1. High degree of Operation & Maintenance (O&M) intensity 2. Average degree of capital investment 3. Average reliability & low maintenance 4. Low degree of general costs

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
18.	**Phytoremediation** Phytoremediation is a set of processes that uses plants to remove, transfer, stabilize and destroy organic/ inorganic contamination in ground water, surface water, and leachate.	Phytoremediation can be used to clean up organic contaminants from surface water, ground water, leachate, and municipal and industrial wastewater.	Key Cost Drivers 1) Scale of effort Area of contamination is the primary cost driver 2) Tree size (maturity) is the secondary cost driver.	1. Low degree of Operation & Maintenance (O&M) intensity 2. Low degree of capital investment 3. Low reliability & low maintenance 4. Low degree of general costs
In- Situ Physical/Chemical Treatments for Groundwater and Surface Water Contaminated Sites				
19.	**Air Sparging** Air is injected into saturated matrices to remove contaminants through volatilization	The target contaminant groups for air sparging are VOCs and fuels.	Key Cost Drivers 1) Surface area (contaminant orientation) Surface area of contamination is the primary cost driver, and directly affects the quantity of air sparge points. 2) Depth to Contamination Depth is the secondary cost driver. Cost increases with depth since it impacts the drilling costs.	1. Low degree of Operation & Maintenance (O&M) intensity 2. Low degree of capital investment 3. High reliability & low maintenance 4. Low degree of general costs
20.	**Bioslurping** Bioslurping combines the two remedial approaches of bioventing and vacuum-enhanced free-product recovery. Bioventing stimulates the aerobic bioremediation of hydrocarbon-contaminated soils. Vacuum-enhanced free-product recovery extracts LNAPLs from the capillary fringe and the water table.	Bioslurping can be successfully used to remediate soils contaminated by petroleum hydrocarbons. It is a cost-effective in situ remedial technology that simultaneously accomplishes LNAPL removal and soil remediation in the vadose zone. Bioslurping is also applicable at sites with a deep ground water table (>30ft.).		1. Low degree of Operation & Maintenance (O&M) intensity 2. Low degree of capital investment 3. Average reliability & low maintenance 4. Low degree of general costs
21.	**Chemical Oxidation** Oxidation chemically converts hazardous contaminants to non-hazardous or less toxic compounds that are more stable, less mobile, and/or inert. The oxidizing agents most commonly used are ozone, hydrogen peroxide, hypochlorites, chlorine, and chlorine dioxide.		Key Cost Drivers 1) Economy of Scale Quantity of material treated has a large impact 2) Moisture content in waste Slight increase in costs between soil and sludge 3) Contaminant concentrations High influent and low effluent concentrations will drive up costs	1. High degree of Operation & Maintenance (O&M) intensity 2. Average degree of capital investment 3. Average reliability & low maintenance 4. Average degree of general costs

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
22.	**Dual Phase Extraction** A high vacuum system is applied to simultaneously remove various combinations of contaminated ground water, separate-phase petroleum product, and hydrocarbon vapor from the subsurface.	The target contaminant groups for dual phase extraction are VOCs and fuels (e.g., LNAPLs). Dual phase vacuum extraction is more effective than SVE for heterogeneous clays and fine sands.	Key Cost Drivers 1) Soil Type Soil type determines permeability, which is the primary cost driver. Dual phase extraction works best for permeable sand-silt mixtures. Impermeable (clayey) or excessively permeable (gravel/sand) soils are more recalcitrant. 2) Depth to Base of Contamination Depth to the base of contamination is the secondary driver, as an increased thickness and depth of contaminated groundwater increases cost.	1. High degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. Average reliability & low maintenance 4. Average degree of general costs
23.	**In-Well Air Stripping** Air is injected into a double screened well, lifting the water in the well and forcing it out the upper screen. Simultaneously, additional water is drawn in the lower screen. Once in the well, some of the VOCs in the contaminated ground water are transferred from the dissolved phase to the vapor phase by air bubbles. The contaminated air rises in the well to the water surface where vapors are drawn off and treated by a soil vapor extraction system.	The target contaminant groups for vacuum vapor extraction are halogenated VOCs, SVOCs, and fuels.	Data Not Available	1. Average degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. Average reliability & low maintenance 4. Average degree of general costs
24.	**Passive/Reactive Treatment Walls** These barriers allow the passage of water while causing the degradation or removal of contaminants.	Target contaminant groups for passive treatment walls are VOCs, SVOCs, and inorganics. The technology can be used, but may be less effective, in treating some fuel hydrocarbons.	Key Cost Drivers 1) Economy of Scale 2) Quantity of material treated has a large impact 3) Width of the plume to be treated • Choice of supplemental amendments • Additional monitoring required by regulators	1. Average degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. Low reliability & low maintenance 4. Average degree of general costs

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
In- Situ Thermal Treatment for Groundwater and Surface Water Contaminated Sites				
25.	**Thermal Treatment** Steam is forced into an aquifer through injection wells to vaporize volatile and semivolatile contaminants. Vaporized components rise to the unsaturated zone where they are removed by vacuum extraction and then treated.	The target contaminant groups for hot water or steam flushing/stripping are SVOCs and fuels. VOCs also can be treated by this technology, but there are more cost-effective processes for sites contaminated with VOCs.	The most significant factor affecting cost is the time of treatment or treatment rate. With the mobile system, treatment rate is influenced primarily by the soil type, waste type, and on-line efficiency. Cost estimates for this technology are strongly dependent on the treatment rate and range.	1. High degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. Average reliability & low maintenance 4. Average degree of general costs
Ex- Situ Biological Treatment for Groundwater and Surface Water Contaminated Sites				
26.	**Constructed Wetlands** The constructed wetlands-based treatment technology uses natural geochemical and biological processes inherent in an artificial wetland ecosystem to accumulate and remove metals, explosives, and other contaminants from influent waters.	Constructed wetlands have most commonly been used in wastewater treatment for controlling organic matter; nutrients, such as nitrogen and phosphorus; and suspended sediments.	Data Not Available	1. Average degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. NA 4. Average degree of general costs
Ex- Situ Physical/Chemical Treatment for Groundwater and Surface Water Contaminated Sites				
27.	**Adsorption/Absorption** In liquid adsorption, solutes concentrate at the surface of a sorbent, thereby reducing their concentration in the bulk liquid phase.	The target contaminants groups for adsorption/ absorption processes are most organic contaminants and selected inorganic contaminants from liquid and gas streams.		1. High degree of Operation & Maintenance (O&M) intensity 2. Average degree of capital investment 3. Average reliability& low maintenance 4. High degree of general costs
28.	**Advanced Oxidation Processes** Advanced Oxidation Processes including ultraviolet (UV) radiation, ozone, and/or hydrogen peroxide are used to destroy organic contaminants as water flows into a treatment tank. If ozone is used as the oxidizer, an ozone destruction unit is used to treat collected off gases from the treatment tank and downstream units where ozone gas may collect, or escape.	Practically any organic contaminant that is reactive with the hydroxyl radical can potentially be treated.	Factors that influence the cost to implementing UV/ oxidation include: - Types and concentration of contaminants (as they affect oxidizer selection, oxidizer dosage, UV light intensity, and treatment time). - Degree of contaminant destruction required. - Desired water flow rates. - Requirements for pretreatment and/or post-treatment.	1. High degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. Average reliability & low maintenance 4. Average degree of general costs

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
29.	**Air Stripping** Volatile organics are partitioned from extracted ground water by increasing the surface area of the contaminated water exposed to air. Aeration methods include packed towers, diffused aeration, tray aeration, and spray aeration.	Air stripping is used to separate VOCs from water. It is ineffective for inorganic contaminants. Henry's law constant is used to determine whether air stripping will be effective. Generally, organic compounds with constants greater than 0.01 atmospheres - m3/mol are considered amenable to stripping.	Key Cost Drivers • Influent flow rate • Relative contaminant volatility • Off-gas treatment (when necessary)	1. High degree of Operation & Maintenance (O&M) intensity 2. Average degree of capital investment 3. High reliability & low maintenance 4. Low degree of general costs
30.	**Granulated Activated** Carbon (GAC)/Liquid Phase Carbon Adsorption Ground water is pumped through a series of canisters or columns containing activated carbon to which dissolved organic contaminants adsorb. Periodic replacement or regeneration of saturated carbon is required.	The target contaminant groups for carbon adsorption are hydrocarbons, SVOCs and explosives.	Costs associated with GAC are dependent on wastestream flow rates, type of contaminant, concentration of contaminant, mass loading, required effluent concentration, and site and timing requirements.	1. High degree of Operation & Maintenance (O&M) intensity 2. Average degree of capital investment 3. High reliability & low maintenance 4. Average degree of general costs
31.	**Groundwater Pumping/ Pump and Treat** Ground water pumping is a component of many pump-and-treat processes, which are some of the most commonly used ground water remediation technologies at contaminated sites.		Cost varies from site to site for ground water pump and treat technology.	1. High degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. High degree of general costs
32.	**Ion Exchange** Ion exchange removes ions from the aqueous phase by exchange with counter ions on the exchange medium.	Ion exchange can remove dissolved metals and radionuclides from aqueous solutions. Other compounds that have been treated include nitrate, ammonia nitrogen, and silicate.	Key cost factors include: -Pretreatment requirements. -Discharge requirements and resin utilization. -Regenerant used and efficiency.	1. High degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. Average degree of general costs
33.	**Precipitation/ Coagulation/Flocculation** This process transforms dissolved contaminants into an insoluble solid, facilitating the contaminant's subsequent removal from the liquid phase by sedimentation or filtration.	Precipitation is used mainly to convert dissolved ionic species into solid-phase particulates that can be removed from the aqueous phase by coagulation and filtration. Remedial application of this technology usually involve removal of dissolved toxic	Key Cost Drivers • No sensitivity analysis possible as only variable is influent flow rate.	1. Average degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. Average degree of general costs

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
	The process usually uses pH adjustment, addition of a chemical precipitant, and flocculation.	metals and radionuclides. Depending on the process design, sludges may be amenable to metal recovery		
34.	**Separation** Separation techniques concentrate contaminated waste water through physical and chemical means.	The ex situ separation process is used mainly as a pretreatment or post-treatment process to remove contaminants from waste water.		1. Average degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. High degree of general costs
Containment for Groundwater and Surface Water Contaminated Sites				
35.	**Physical Barriers** These subsurface barriers consist of vertically excavated trenches filled with slurry. The slurry, usually a mixture of bentonite and water, hydraulically shores the trench to prevent collapse and retards ground water flow.	Slurry walls contain the ground water itself, thus treating no particular target group of contaminants. They are used to contain contaminated ground water, divert contaminated ground water from drinking water intake, divert uncontaminated ground water flow, and/or provide a barrier for the ground water treatment system.	Factors that have the most significant impact on the final cost of soil-bentonite slurry wall installation include: -Type, activity, and distribution of contaminants. -Depth, length, and width of wall. -Geological and hydrological characteristics. -Distance from source of materials and equipment. -Requirements for wall protection and maintenance. -Type of slurry and backfill used. -Other site-specific requirements as identified in the initial site assessment (e.g., presence of contaminants or debris). -Planning, permitting, regulatory interaction, and site restoration.	1. Average degree of Operation & Maintenance (O&M) intensity 2. High degree of capital investment 3. High reliability & low maintenance 4. Low degree of general costs

Appendix A

List of various violations vis-à-vis provisions of Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

A. Management of Hazardous and other waste:

1) Not managing hazardous and other wastes in safe and environmentally sound manner.

…[Rule 4(2)]

2) Occupier not sending hazardous and other wastes or selling to an authorised actual user or disposing in an authorised disposal facility.

…[Rule 4(3)]

3) Occupier not transporting hazardous and other wastes to an authorised actual user or to an authorised disposal facility in accordance with the provisions of HOWM Rules, 2016.

…[Rule 4(4)]

4) Occupier not giving specific information (as may be needed for safe storage and disposal of hazardous and other waste) to the operator of treatment, storage and disposal facility.

…[Rule 4(5)]

5) Occupier not taking all the steps while managing hazardous and other wastes to:
   a. contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and

…[Rule 4(6)(a)]

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

…[Rule 4(6)(b)]

B. Authorization

6) (A) Occupier (requiring Consent to establish or operate under the Water (Prevention and Control of Pollution) Act, 1974 and Air (Prevention and Control of Pollution) Act, 1981) operating facility without making application for authorisation or without obtaining[1] authorisation or operating with the suspended /cancelled authorisation or refused for each of the following activities pertaining to hazardous and other wastes, as applicable:
   (i) handling;

[1] In cases where application for fresh or renewal authorisation application has been made by occupier as per requirement of the HOWM Rules, 2016, and no communication has been made by SPCB/PCC within 120 days of receipt of the said application, violation may not be considered on part of the occupier.

(ii) generation;
(iii) collection;
(iv) storage;
(v) packaging;
(vi) transportation;
(vii) treatment;
(viii) processing;
(ix) recycling;
(x) pre-processing
(xi) co-processing;
(xii) utilisation, and;
(xiii) offering for sale, transfer or disposal

(Each violation among the 13 above would be considered as one violation)

...[Rule 6(1)]

(B) Violations of conditions of authorisation

...**[Rule 6(2) read with items listed in Form 2]**

(a) The person authorised has rented, lent, sold, transferred or otherwise transported the hazardous and other wastes except what is permitted through the authorisation.

...[Item no. 3 of A of the Form 2]

(b) Unauthorised change in personnel, equipment or working conditions as mentioned in the application by the person authorised.

...[**Item no. 4 of A of the Form 2]**

(c) Not implemented Emergency Response Procedure (ERP) for which the authorisation has been granted and carried out mock drill at regular interval of time;

...[Item no. 5 of A of the Form 2]

(d) Not complied with each of the following liabilities, as outlined in the CPCB guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty":

(a) Liability for taking up immediate Emergency Response Plan;
(b) Liability for assessment of contamination, and;
(c) Liability for remediation of contaminated site.

..[Item no. 6 of A of the Form 2]

(e) Closing down the facility without taking prior permission of SPCB/PCC.

...[Item no. 7 of A of the Form 2]

(f) Imported hazardous and other wastes not fully insured for transit as well as for any accidental occurrence and its clean-up operation.

...[Item no. 8 of A of the Form 2]

(g) Not maintained record of consumption and fate of the imported hazardous and other wastes

...[Item no. 9 of A of the Form 2]

(h) Application for renewal of authorisation not made three months before the expiry of such authorisation along with other requisite documents

...[Item no. 12 of A of the Form 2]

(i) Non-compliance of each of the other conditions under head "Specific Conditions" laid down under the authorisation, as applicable.
(Each such violation to be considered as one violation)

...[Items under B of the Form 2]

(C) The authorised actual user of hazardous and other wastes not maintaining records of hazardous and other wastes purchased in passbook issued by SPCB/PCC along with the authorisation.

...[Rule 6(7)]

(D) Occupier not handing over the hazardous and other wastes to the authorised actual user by making the entry into the passbook of the actual user.

...[Rule 6(8)]

7) Occupiers, whose authorisation has been cancelled or suspended, not complying with directions of SPCB/PCC for safe storage and management of the hazardous and other wastes.

...[Rule 7(2)]

C. Storage of hazardous and other waste

8) Occupiers storing the hazardous and other wastes for more than 90 days (or other periods specified in case specified by SPCB/PCC, as applicable) or not maintaining record of sale, transfer, storage, recycling, recovery, pre-processing, co-processing and utilisation of such wastes or making these records available for inspection:

...[Rule 8]

D. Utilisation of hazardous and other wastes

9) Utilisation of hazardous and other wastes including within the premises of the generator (if it is not part of process) is not carried out after obtaining authorisation from SPCB/PCC and in respect of waste on the basis of SOP or guidelines provided by CPCB.

...[Rule 9(1)]

10) Cement plant operator not complying with standards notified under the Environment (Protection) Act, 1986 while co-processing hazardous or other waste.

...[Rule 9(3)]

E. Import and Export of Hazardous and other waste to India

11) Import of hazardous and other wastes from any country to India has been done for disposal.

...[Rule 12(1)]

12) Hazardous and other wastes imported from any country other than recycling, recovery, reuse and utilisation including co-processing.

...[Rule 12(2)]

13) Import of hazardous waste listed in Part A of Schedule III by actual users without the prior informed consent of the exporting country and permission* of MoEF&CC.

...[Rule 12(3)]

14) Other wastes in Part B of Schedule III have not been imported by actual users or if by actual users then without permission* of the MoEF&CC.

...[Rule 12(4)]

15) The import of other wastes in Part D of Schedule III will be allowed as per procedure given in rule 13 and as per the note below the said Schedule.

16) Hazardous and other wastes specified in Schedule VI have been imported.

...[Rule 12(6)]

17) Export of hazardous and other wastes from India listed in Part A and Part B of Schedule III and Schedule VI has not been done with the permission of MoEF&CC.

...[Rule 12(7)]

18) Import or transit for transboundary movement of hazardous and other wastes specified in Part A and Part B of Schedule III has been by declaring wrong information in Form 5 (each of such items of Form 5, which has been wrongly declared, would be considered as one number of corresponding violation for calculating financial penalty)

...[Rule 13(1) read with various items in Form 5 and corresponding item of Form 5]

19) Importer not furnish the required information as per Form 6 of the custom authority accompanied with the document as stipulated under Rule 13(2)

...[Rule 13(2)]

20) Import of used electrical and electronic assemblies or spares or part or component or consumables as listed under Schedule I of the E-Waste (Management and Handling) Rules, 2011, as amended from time to time, has been done without obtaining extended producer responsibility-authorisation as producer under the said E-Waste (Management and Handling) Rules, 2011, as amended.

...[Rule 13(3)]

21) Shipment for import is not accompanied with the movement document as given in **Form 6** and the test report of analysis of the waste, consignment, wherever applicable, from a laboratory accredited or recognised by the exporting country. Or, the analysis report does not match with report of customs, if done.

...[Rule 13(10)]

F. Export of hazardous and other wastes from India

22) Occupier exported waste specified in Part A of Schedule III, Part B of Schedule III and Schedule VI of the HOWM Rules, 2016, with wrong declarations in **Form 5** or without insurance cover or without prior informed consent in writing from the importing country in respect of wastes specified in Part A of Schedule III and Schedule VI. (each of such items of Form 5, which has been wrongly declared, would be considered as one number of corresponding violation for calculating financial penalty)

...[Rule 14(1) read with various items in Form 5 and corresponding item of Form 5]

23) Waste specified in Part A of Schedule III, Part B of Schedule III and Schedule VI of the HOWM Rules, 2016, has been exported without permission of MoEF&CC

...[Rule 14(2)]

24) Consignment is shipped for export before the prior informed consent is received from the importing country, wherever applicable.

...[Rule 14(4)]

25) Shipment for export is not accompanied with movement document in Form 6.

...[Rule 14(5)]

26) Records of the hazardous or other waste exported by exporter is not maintained him in Form 3.

...[Rule 14(6)]

27) Illegal import of the hazardous or other waste has not been re-exported by the importer (when traceable) at his cost within a period of ninety days from the date of its arrival into India

...[Rule 15(2)]

G. Import and Export of Hazardous and other waste

28) Import or export of hazardous and other wastes not specified in Schedule III, but exhibiting the hazardous characteristics outlined in Part C of Schedule III has been done without written permission[2] of the MoEF&CC.

...[Rule 12(8)]

[2] Not applicable incase of import of samples of hazardous and other wastes being for testing or research and development purposes up to 1000 gm or 1000 ml shall be exempted from need of taking permission for import under these rules.

H. Operator of Common or Captive Treatment, storage and disposal facility operator

29) Operator of common treatment, storage and disposal facility (TSDF) or occupier of captive TSDF has not set up the common/ captive facility as per technical guidelines issued by CPCB from time to time and without obtaining approval from the SPCB/PCC

...[Rule 16(2)]

30) Operator of common TSDF or occupier of captive TSDF is not operating the facility in safe and environmentally sound manner and its closure and post closure phase, as per guidelines or standard operating procedures issued by CPCB.

...[Rule 16(4)]

I. Packaging and Labelling

31) Any occupier handling hazardous or other wastes and operator of the treatment, storage and disposal facility not packaging in a manner suitable for safe handling, storage and transport as per the CPCB guidelines.

...[Rule 17(1)]

Or

The labelling has not done as per **Form 8.**

...[Rule 17(1)]

32) The label was washable material, weather proof and not easily visible.

...[Rule 17(2)]

J. Transportation

33) The transport of the hazardous and other waste not in accordance with the provisions of these rules and the rules made by the Central Government under the Motor Vehicles Act, 1988.

...[Rule 18(1)]

Or

The transportation of the hazardous and other waste was not in accordance with the guidelines issued by CPCB.

...[Rule 18(1)]

34) The occupier not provided the transporter with the relevant information in **Form 9,** regarding the hazardous nature of the wastes.

...[Rule 18(2)]

Or

The occupier not taken any measures in case of an emergency

...[Rule 18(2)]

Or

The occupier has not labeled the hazardous and other wastes containers as per **Form 8**.

...[Rule 18(2)]

35) Not obtained 'No Objection Certificate' from the State Pollution Control Board of both the States, for transportation of hazardous and other waste for final disposal to a facility existing in a State other than the State where the waste is generated.

...[Rule 18(3)]

36) Not intimated to both SPCBs for recycling or utilisation including co-processing before handing over the waste to the transporter.

...[Rule 18(4)]

37) Not given prior intimation to concerned SPCB, in case of transit of hazardous and other waste for recycling, utilisation including co-processing or disposal before handing over the wastes to the transporter to the States of transit.

...[Rule 18(5)]

38) Not taken authorization from SPCB for safe transport in case of transportation of hazardous and other waste by sender

...[Rule 18(6)]

Or

Not taken authorization from SPCB for safe transport in case of transportation of hazardous and other waste by receiver

...[Rule 18(6)]

39) Not taken authorisation for transport either by the sender or the receiver on behalf the transport is being arranged.

...[Rule 18(7)]

K. Manifest system

40) The sender has not complied with preparation of the requisite seven copies of the manifest in **Form 10** comprising of colour code indicated

...[Rule 19(1)]

Or

The sender has not signed all seven copies

...[Rule 19(1)]

41) The sender has not sent copy 1 (white) to SPCB after signing (requirement of copy 1 (white) manifest as laid down under Rule 19).

...[Rule 19(1a)]

42) The sender has not retained copy 2 (yellow) after taking signature on it from transporter (requirement of copy 2 (yellow) manifest as laid down under Rule 19).

...[Rule 19(1b)]

43) The receiver (actual user or treatment storage and disposal facility operator) has not retained copy 3 (pink) after receiving the waste (requirement of copy 3 (pink) manifest as laid down under Rule 19)

...[Rule 19(1c)]

44) The receiver has not given copy 4 (orange) to transporter after receiving the waste (requirement of copy 4 (orange) manifest as laid down under Rule 19)

...[Rule 19(1d)]

45) The receiver has not sent copy 5 (green) to SPCB (requirement of copy 5 (green) manifest as laid down under Rule 19).

...[Rule 19(1e)]

46) The receiver has not sent copy 6 (blue) to sender (requirement of copy 6 (blue) manifest as laid down under Rule 19).

...[Rule 19(1e)]

47) Transporter accepted waste from the sender for transport without signed copies 3 to 7 of the manifest.

...[Rule 19(3)]

48) The transporter has not submitted copies 3 to 7 of the manifest duly signed with date to the receiver along with the waste consignment.

...[Rule 19(4)]

L. Records and returns.-

49) The occupier handling hazardous or other wastes and operator of disposal facility not maintain records of such operations in **Form 3.**

...[Rule 20(1) or 16(5) or 13(7) or 6(5)]

50) The occupier handling hazardous and other wastes and operator of disposal facility not submitted annual returns to SPCB in **Form 4.**

...[Rule 20(2) or 16(6) or 13(8) or 6 (5)]

M. Accident reporting. –

51) Occupier has not intimated to SPCB about accident through telephone, e-mail and subsequently in **Form 11.**

...[Rule 22]

Item No. 04 & 05 Court No. 1

BEFORE THE NATIONAL GREEN TRIBUNAL
PRINCIPAL BENCH, NEW DELHI
(Through Video Conferencing)

Original Application No. 804/2017
(Earlier O.A. No. 36/2012)
WITH
M.A. No. 1302/2018
IN
Interlocutory Application No. 63
IN
W. P. (C) No. 657/1995

Rajiv Narayan & Anr Applicant(s)

Versus

Union of India & Ors. Respondent(s)

With

The Research Foundation for Science, Technology
And Natural Resource Policy Applicant(s)

Versus

Union of India & Ors. Respondent(s)

Date of hearing: 12.04.2019

CORAM: HON'BLE MR. JUSTICE ADARSH KUMAR GOEL, CHAIRPERSON
HON'BLE DR. NAGIN NANDA, EXPERT MEMBER

For Applicant(s): Mr. Raj Panjwani, Senior Advocate
Ms. Meera Gopal, Advocate
Mr. Rahul Choudhary, Advocate
For Respondent (s): K. Enatoli Sema and Mr. Amit Kumar Singh Advocates for State of Nagaland
Mr. Manish Kumar, Advocate
Mr. Sriansh Prakash and Mr. Raj Kumar Maurya, Advocates for EDMC
Mr. Daleep Dhyani, Advocate for UPPCB
Mr. Amit Tiwari, Advocate for SOUP
Mr. Raj Kumar, Advocate for CPCB

ORDER

1. The issue for consideration is non-compliance of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. The status reports filed by the States were considered with reference to the following:

"1. As to what is the total generation of hazardous waste in their respective States.

2. Which agencies have been authorized in terms of rules to collect, transport, disposed of and the process of the hazardous wastes.

3. What is the capacity of the plants which have been given due authorization for that purpose.

4. What happens and how the remnant hazardous waste is being dealt with.

5. The members who have been allotted any of the authorized plants and are not sending hazardous waste to those plants. What action the concerned authorities i.e. the State Government and the respective States and State Pollution Control Boards have taken so far, against such members.

These details should be filed within one week from today."

2. Vide order dated 30.07.2018, the Tribunal found that Central Pollution Control Board (CPCB) was required to prepare a consolidated review report every year under Rule 20, based on reports of the State Pollution Control Boards (SPCBs). The Tribunal directed as follows:

"(i) All the States, where the hazardous waste is being generated must set up Treatment, Storage and Disposal Facility (TSDF) facility of adequate capacity at appropriate locations within three months from today and forthwith imitate action against erring units.

(ii) Central Government and Central Pollution Control Board must forthwith monitor the compliance of the rules by reviewing the need for action in all the states.

(iii) The Central Pollution Control Board may forthwith constitute a monitoring Committee for the purpose it may appoint a Nodal Officer exclusively to oversee the compliance of the rules. The Member Secretary CPCB may act as a Nodal Officer till a substitute is found. The action taken must be placed on the website of the Central Pollution Control Board within 3 months from today. Compliance report be filed before this Tribunal on or before 30th November, 2018, which will be treated as a separate application."

3. Setting up of Treatment, Disposal and Storage Facility (TSDF) being an urgent and important requirement which was required to be monitored as above. In compliance of the directions of the Tribunal, an affidavit has been filed on 08.02.2019 by the CPCB stating that on 09.08.2018 a Monitoring Committee was constituted headed by Dr. Ajay A. Deshpande, former Expert Member, NGT. CPCB also issued directions under Section 5 of the Environment (Protection) Act, 1986 on 30.01.2019 for all the SPCBs/Pollution Control Committees (PCCs) as follows:

"a) Ensure that all the solvent recovery industries in the state have mandatory Authorisation for the same in compliance with the SOP and Checklist issued by CPCB for solvent recovery units, within one month. The said SOP and checklist have been circulated to all SPCBs/PCCs vide letter no. B29016/(SC)/1(55-IV)/17-18/WM-II/18152-86 dated 08/3/2018 and is also available at CPCB website http://cpcb.nic.in/uploads/hwmd/utilizaionspent solvent.pdf.

b) Ensure that these solvent recovery industries shall immediately follow the SOP, for safe and scientific spent solvent handling, processing and storage.

c) Ensure that such solvent recovery units shall comply with the provisions of HOWM Rules, 2016, in terms of interstate transport of Hazardous waste and manifest document prescribed under Rule 18 and 19 of the HOWM Rules, 2016, with immediate effect. Stringent action be taken against the erring industries who are giving the spent solvent to such recycling industries without following the manifest systems.

d) Conduct industry interaction programs within a month to create awareness and sensitization on HOWM Rules, 2016 with all the stakeholder industries of Spent Solvent generation/utilization.

e) Prepare an inventory of such solvent recovery units and publish the same on their website for information of all, stakeholders within one month with copy to CPCB within one month."

4. The Monitoring Committee furnished its interim report in compliance of orders of this Tribunal after reviewing the various aspects of enforcement of the Rules proposing actions as follows:

" | **Sl.** | **Observations** | **Proposed Actions (Responsible**

No.		Agency and timeline of action)
1	**Hazardous waste identification: - Uniformity in assessment, Byproducts and solvents (Details in Chapter 4 – Section 4.1.1)** a. The Rules define by-products very categorically linking it to its intended use. Presently, there is no verification or appraisal of such continuous intended use before classifying certain waste as a byproduct. There is a need for SOP/guidelines for identification of by-products based on the manufacturing process as well as intended use. b. Applicability of various clauses of the HW Rules to the 'other waste' also needs to be defined clearly in the Rules itself. c. Presently, there is hardly any scientific examination or scrutiny for identification and quantification of HW prior to grant of authorisation. d. The HW Rules basically focuses on a close loop approach for the HW Management which is reflected in the adoption of manifest system in order to ensure that the HW movement is continuously tracked till its final disposal (Cradle to Grave approach). e. However, in case of spent solvent sent for solvent recovery, such manifest system seems to be ending at the door step of the spent solvent recycler. It would be advisable to continue this manifest system right upto the actual user of such recovered solvent from solvent recovery plant to ensure appropriate regulation of spent solvent plant performance and appropriate accounting and use of recovered solvent. The similar approach is also required to be adopted in all cases of recycling/recovery/ utilisation such as used oil, waste oil, lead scrap, spent acid, spent catalyst, etc.	1. There is a need to urgently prepare a guidelines or protocol on how to decide the by-product on specific criteria. This can be done based on chemical process involved in order to bring consistency in approach. (MoEF&CC and CPCB: 06 months) 2. Other waste is presently missing from all the regulatory actions, including inventory. It is necessary to bring such waste in regulatory domain, as envisaged in the rules. (SPCBs/PCCs: inventory of 2018-19 onwards). 3. SPCBs/PCCs need to take steps to ensure closing of the manifests received and reconcile the HW handling data. This work is humungous and need support in terms of software and online submissions. (SPCBs/PCCs). 4. Pan India IT based solution is suggested for tracking HW. Such integrated data handling and management solution is under implementation by CPCB which the committee would like to review in next phase. 5. The pre-processing and recycling/utilisation facilities need to be treated as critical environmental infrastructure facilities for sound environmental management of hazardous waste so as to ensure enhanced level and frequency of enforcement and environmental monitoring. Elaborate protocols are needed to be developed. (SPCBs/PCCs: continuous activity). 6. According to Rules, the identification and quantification of the hazardous waste generation is to be done at the authorisation stage itself and therefore, it is necessary that SPCBs shall adopt the scientific principles as enumerated for such identification and quantification of HW. (SPCB/PCCs: Immediate)

2.	**Grant of Authorisation by SPCBs/PCCs (Details in Chapter 4 – Section 4.1.2)** a. The Rules stipulates requirement of enclosing field inspection report while granting authorisation b. The committee observed that only in few cases the SPCBs are enclosing the said field inspection report alongwith authorisation granted. c. Further, such filed inspection report lacks details w.r.t to adequacy of the facilities on storage, transportation, treatment, recycling/utilisation, disposal, etc.	1. Uniform format for visits and inspections of HW handling facilities is necessary to ensure comprehensive inspections as per the provisions of the Rules. A format is proposed by the Committee which is given at **Annexure XVI**. 2. The authorisation document should clearly stipulate respective mode of management (such as common or captive incineration/secured landfilling or pre-processing or recycling or utilization or export or captive storage, as applicable) for each category of HW being generated. (SPCB/PCCs: immediate)
3.	**Inventory (Details in Chapter 4 – Section 4.2)** a. Inventories are based on reporting by the generators/occupiers through annual report as well as authorisation. b. The inventory data do not cover all the industries who have been granted authorisation. It also does not cover the hazardous waste from domestic sources, interstate movement, import/export of hazardous waste, and other waste. c. The inventories are not verified and validated based on the scientific principles by the State Pollution Control Boards/Pollution Control Committees (SPCBs/PCCs). d. There is a substantial variation in the quantity declared in the authorisation and actual quantity of hazardous waste generation declared in the annual report. e. Quantities reported in the captive utilisation of hazardous waste appear to be on higher side and are not verified. f. There are no standard protocol/guidelines for preparation of HW inventory based on sound scientific principles and approach which is a basic necessity to ensure uniform and consistent preparation of HW inventory by different	1. Standard guidelines and protocol based on scientific fundamentals for preparation of inventory should be prepared by CPCB and strictly followed by the SPCBs/PCCs to ensure reliable and credible inventory. (SPCBs/PCCs and CPCB/: inventory of 2018-19 onwards) 2. SPCBs/PCCs shall verify and scientifically validate the HW data and facilities before grant or renewal of authorisation. (SPCBs/PCCs: inventory of 2018-19 onwards) 3. There is an emergent need to develop sectoral process based reasonable HW generation range to have uniformity in assessing the HW generation from industries and benchmarking the same with its peers, rather than solely depending on industry data. (SPCBs/PCCs: continuous activity) 4. All occupiers who have authorisations shall submit the Annual report and in case of non-compliance, action needs to be taken by SPCB/PCC. (SPCBs/PCCs: inventory of 2018-19 onwards) 5. The timelines for inventory preparation as envisaged in Rules be strictly complied with by SPCBs/PCCs. Preparation of country's inventory by CPCB is dependent on such timely submission by SPCBs/PCCS. (SPCBs/PCCs and CPCB)

	SPCBs/PCCs.	
4.	**Enforcement actions. (Details in Chapter 5)** a. Though there have been several incidents on record of noncompliance of HW Regulations resulting in discharge of HW in environment, the powers vested with the CPCB/SPCBs/PCCs for recovering environmental damages under Rules 23(1) has not been invoked. b. Only three States namely Maharashtra, Telangana and Madhya Pradesh have reported prosecution actions under Section 15 of EP Act, 1986. c. There are hardly few cases where the SPCBs/PCCs have invoked provisions related to revocation and/or refusal of authorisation in view of the observed noncompliances. d. Inspection report, mostly is not attached along with the authorisation granted. Wherever inspection reports have been attached such reports lack in required information for appraisal.	1. SPCBs/PCCs shall invoke the powers conferred under clause 23 (1) and (2) of the Rules, related to all damages caused to the environment or third party due to improper handling and management of the hazardous and other wastes, and non-compliance respectively. CPCB has already issued guidelines for Liability assessment, for invoking clause 23(1) and (2) of HW Rules. CPCB shall also take consequential actions under clause 23 (1) as per the said guidelines wherever directions under section 5 of the E(P) Act have been issued by CPCB, noticing environmental damages. (SPCBs/PCCs and CPCB: Immediate). 2. The habitual and serious defaulters shall be prosecuted under provisions of the Environment (Protection) Act, 1986. Other alternative regulatory actions including refusal and revocation of Authorisation can also be explored following the due process. (SPCBs/PCCs: Immediate) 3. Non-compliance to be documented while processing authorisation for renewal or inspections in order to invoke powers of refusal or revocation of Authorisation as per Rules. (SPCBs/PCCs: Immediate) 4. Urgent updation of concerned websites of SPCBs/PCCs/CPCB with respect to all enforcement actions along with details of industries and action taken. (SPCBs/PCCs/ CPCB: Immediate) 5. There is need to have an enforcement framework for effective enforcement of Rules based on principle of proportionality and also, precautionary principle. Such framework will remove ambiguity in regulatory actions and bring transparency, predictability and consistency in enforcement for actions. (SPCBs/PCCs/CPCB: within 06 months)
5.	**Hazardous waste utilisation and recycle. Issues and need of improvements (Details in Chapter 4 – Section 4.3)** a. The inventory data shows skewed variation in utilisation of HW pattern among different	1. The inventory data needs to be verified and validated before accepting the same. The states shall adopt the proposed guidelines immediately while preparation of HW inventory. (SPCBs/PCCs: Immediate)

	States. For example in Gujarat about 36 % of the HW generated is either recycled or utilised, whereas in Maharashtra 0.98 % HW generated is recycled and utilised. b. Maharashtra is not authorising and promoting the co-processing which is one of the major option of utilisation of HW, although the HW Rules provided hierarchy of waste management promoting recycle and utilisation of the HW. There is a need to have a consistent and scientific approach to promote the HW recycle and reuse in consonance of the objective of the HW Rules expressed in terms of hierarchy, throughout the country. c. There are certain environmental risks associated with the recycle and utilisation of the HW in case of non-compliance. It is therefore necessary that such recycle and utilisation of HW is strictly regulated in terms of the performance of such recycle and utilisation. d. There is need to immediately prepare guidelines for high volume low impact waste like slags from pyrometallurgical operations, fly ash, red mud, Jarosite, mine tailings and ore beneficiation rejects. e. More clarity is required on the application of Rule 9 particularly in case of captive utilisation. Presently, it is very difficult for SPCB/PCC field staff to investigate and analyse such claims of industry. Therefore, presently, the data given by industry is relied upon in totality. f. The pre-processing facilities collect the HW from different industries and carry out the homogenization/blending activities to achieve the required calorific value and other desired specification for co-processing. As this industry sector indulge in handling the wide range of	2. There is emergent need of consistent approach in recycle and utilisation of HW in terms waste management hierarchy mandated in the rules across all the States in order to ensure the level playing field for the industry. This can be achieved by advocacy programme such as concept of waste exchange banks, know your waste programme, circular economy, documentation of the success stories along with regulatory interventions wherever required. (SPCBs/PCCs) 3. It is also necessary to develop certain benchmarks/guidelines for the possibilities of HW recycle/utilization on case to case basis. For example, for co-processing at Cement plants the Thermal Substitution Ratio (TSR) can be an objective criterion to decide the potential to use HW for utilisation purpose. The range of TSR at different cement plants can be collated to develop a database for sound coprocessing practices. (SPCBs/PCCs) 4. The concept of environmental benchmarking among the similar industries generating HW can be useful to ensure consistency and uniformity. The emerging trend of circular economy would be a key intervention for rationalising the HW generation and reuse/utilisation (SPCBs/PCCs: continuous activity)

	wastes from different industries, it would be prudent to have improved enforcement regime in terms of number of inspections, detailing of inspection, environmental monitoring and reporting of waste receive/disposed etc. on the lines of common facilities.	
6.	**Common Treatment, Storage and Disposal facilities: reporting. (Details in Chapter 4 – Section 4.5)** a. The Committee has observed that in some cases the TSDF rejects the consignment received from the waste generator for non-compliance of acceptance criteria. This consignment is returned back to the waste generator. b. The site selection criteria, design and layout are the critical parameters for establishment of the TSDF. In addition, waste storage, stabilization, landfilling, incineration and leachate management are critical operations. The committee has observed non-compliance of these guidelines For example TSDF at Balotra, Roorkee, Kanpur, etc. c. Of 18 SPCBs/PCCs having common secured landfills, 06 SPCBs have still not opened Escrow Account provision for postclosure monitoring of common SLF. d. Compliance of the Hon'ble NGT orders dated 30/07/2018 with regard to setting of TSDFs and taking imitating actions against erring units- Only Goa and Odisha have submitted action plan with timeframe for setting of Common SLF + Incinerator and Common Incinerator respectively. Only Odisha has taken action against erring units	1. The practice of returning the HW consignment needs to be immediately stopped and the consignment needs to be stored within the TSDF with information to the waste generator and also the concerned SPCB. The TSDF shall take appropriate measures to dispose this waste at the risk and cost of the waste generator under due information to the SPCB immediately on priority. Though the present guidelines prescribed that the waste shall be sent back to the waste generators, this practice needs to be immediately discontinued in view of non-accounting of the waste once it is out of manifest protocol and the associated environmental risks. (SPCBs/PCCs/TSDFs: immediate) 2. SPCBs/PCCs shall conduct environmental audit including the site selection criteria, design and layout for the TSDFs in next one year. They can engage expert institutes for the purpose and seek CPCB's technical advice on the ToR of the study, if required. (SPCBs/PCCs: 01 year) 3. All the Common SLF shall disclose the mandatory amount deposited in Escrow Account annually to SPCB/PCC, CPCB and display on their website. SPCB/PCC to take action in case of non-compliance. (SPCBs/PCCs: immediate) 4. It is necessary that the Hon'ble NGT orders dated 30/07/2018 with regard to setting up of TSDF and taking imitate actions against erring units be strictly complied with by the concerned State/UT Government and SPCBs/PCCs. (State/UT Governments and SPCBs/PCCs: immediate)
7.	**Contaminated sites: Status, identification, need of urgent action, investment, capacity building,**	1. It is necessary that such contaminated site database is developed after due verification by SPCBs/PCCs and validation by

	guidelines. (Details in Chapter 4 – Section 4.7) The Committee has initiated work on monitoring of direction of the Hon'ble Supreme Court with regard to contaminated site WP 657/1995 and has discussed the matter with SPCBs/PCCs/CPCB and the petitioner Shri Sanjay Parikh, Adv. The Committee recognised the monitoring of this aspect has a large scope and the committee intends to focus on this specific issue in coming days. In the mean-time committee has made following preliminary observations and record the need of immediate interventions. a. MoEF&CC/CPCB have identified total 329 potentially hazardous waste contaminated sites and subjected them for screening based on verification by the SPCBs. After the verification by SPCBs, the total 144 sites have been identified as contaminated sites and 57 sites are still under evaluation. The Committee is of the opinion that the identification of the contaminated sites is an elaborate process involving objective criteria and standard protocols. It is expected that SPCBs and CPCB shall follow such objective criteria and standard protocol to identify the contaminated sites and also to assess their scope and extent of contamination. b. Out of 144 identified contaminated sites, CPCB has prioritised 8 sites for which DPR for assessment and remediation has been prepared. However, there is an urgent need to execute this remediation plan on top priority. The Committee has been informed that the required financial resources for such remediation have not been mobilised so far. c. There is a change in number of such identified sites over the period which	CPCB or some expert third party, so as to ensure the reliability of such data base. The entire process of screening, verification and validation needs to be as per standard protocol and the data needs to be owned by both SPCB/PCC and CPCB, not leaving the things at state level alone. (SPCBs/PCCs/CPCB: continuous activity) 2. CPCB should update national priority list of such confirmed contaminated sites. (CPCB: continuous activity) 3. Concerned SPCBs/PCCs shall identify the responsible person/industry, for each of these contaminated sites for suitable application for polluter pays principle for the remediation programme in line with the CPCB guidelines 'Implementing Liabilities for Environmental Damages & Disposal of Hazardous Waste and Penalty'. (SPCBs/PCCs: Immediate and continuous activity) 4. Both SPCBs and CPCB shall continue the process of identification of probable contaminated sites and subject them to identification criteria and decide their status as well as scope and extent of such contamination. This process is a dynamic and need to be a regular feature of enforcement. (SPCBs/PCCs and CPCB: continuous activity) 5. In case of the contaminated sites where the polluter is not identified, the State/UT Government would be required to finance remediation of such sites to safeguard the people living in contaminated areas from adverse health effects, in terms of their constitutional responsibility to protect and improve the environment. (States/UTs Government and SPCBs/PCCs) 6. SPCBs/PCCs need to initiate immediate intervention measures for containing immediate threats from existing contaminated sites (in both active and inactive sites) and also further ingress of HW. (SPCBs/PCCs: immediate)

	could be due to listing/ delisting of probable contaminated sites as a result of increased enforcement and monitoring activities, and variations in criteria.	
8.	**Impact of other regulations (Details in Chapter 4 – Section 4.2)** The committee notes that HW resulting from enforcement of other regulations like E-waste, SW rules etc are presently not accounted in the HW management plans under HW rules. Committee finds a need to consider impact of other regulations while planning HW management including preparation of inventory and assessing the impacts. a. As per E-waste regulation, in case of fluorescent and other mercury containing lamp where recyclers are not available, such waste is channelized to common TSDF for disposal after pretreatment/immobilization of mercury. Such waste should also be accounted into HW inventorisation. b. In case of solid waste rules, there is a separate category of domestic HW which is expected to be disposed in the Common Hazardous facility, however, there is no data or information available on the quantity and quality of such domestic HW available so far.	SPCBs/PCCs and CPCB need to take cognizance of these aspects while enforcing the relevant rules and also, preparation of HW inventory and other interventions. (SPCBs/PCCs and CPCB)
9.	**Import and export. (Details in Chapter 4 – Section 4.6)** a. Harmonization of Basel codes with ITC (HS codes): The Ministry (MOEF) provides permission on the basis of Basel codes while DGFT uses HS codes. There is a need to synchronize the two codes to avoid confusion. b. Risk management assessment: The customs authorities use the risk management system (RMS) to enable low risk consignments to be cleared based on the acceptance of the importer's self-assessment and without examination. Roughly 30 percent of containers covered under risk management out of	Committee would deliberate on this issue further for making detailed recommendations. Still however, following recommendations on co-ordination and data management are made; 1. There is need to synchronise Basel code and HS codes to cover all scheduled items as per HW rules in customs verification and control more effectively. (MoEF&CC, Custom and Port Authorities) 2. CAG has come out with details of illegal HW import and its storage in ports and ICDs. This needs to be verified on priority and action be taken for disposal of the same in terms of earlier orders of Hon'ble Supreme Court. (Custom and Port Authorities) 3. Improve traceability of importers:

	which 10 percent are physically verified. There are different types of waste streams which have not been integrated in the RMS. There is a need to review the import/export data of various waste streams and include them in RMS. Further, waste streams in Schedule III – Parts A, B and D and Schedule VI that are often mis-declared by importers need to be identified and added to the RMS. c. Collaboration between regulating authorities: Regular interaction between the Ministry of Environment, Forest and Climate Change, CPCB, SPCBs/PCCs, customs and ports authorities should take place with frequent consultative meetings and trainings in order to avoid working in silos.	The Customs authorities could make the registration process of importers more stringent as there have been cases where importers have never been able to be traced when their illegal imports were intercepted (MoEF&CC, DGFT, Custom and Port authorities)
10	**Capacity building in CPCB and SPCBs/PCCs and other agencies (trained adequate manpower, laboratory, budget) (Details in Chapter 4 – Section 4.7 and 4.8)**	1. Each of the SPCBs/PCCs/Custom/TSDF, as listed in report, need to have at least one laboratory where all HW parameters as required under the Rules can be analysed. (SPCBs/PCCs/Custom/TSDF: 06 months) 2. Capacity building in SPCBs/PCCs for rapid preliminary assessment of contaminated sites, which may include practical training on use of tools for soil and groundwater screening such as hand-held XRF instruments, Colorimeter, PID for VOCs/ SVOCs, hand operated augers, groundwater pumps, level meters, etc. (CPCB: 06 months) 3.SPCBs/PCCs and CPCB needs capacity building in terms of qualified and experienced manpower and also, tools and techniques for effective governance. Committee is informed about steps being taken by SPCBs and would review the same in detail. (MoEF&CC, State/UT Government, CPCB and SPCBs / PCCs: Immediate)
11.	**Duties performed by State/UT Govt. as stipulated under the HOWM Rules, 2016 (Details in Chapter 5)** The State Govts. have been	1. There is need to sensitize State/UT Govts. about duties required to be performed by the concerned department/agency as stipulated under Rule 5(1), 5(2),

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	entrusted with duties of authorising Dept. of Industry/other Govt. agency and Dept. of Labour/other Govt. agency with regard to allocation/earmarking of industrial space, recognition/ registration/ health & safety/etc. of workers involved in recycling/ preprocessing/ other utilization activities of HW and submission of integrated plan under Rule 5(1), (2) and (3) respectively: The State Govt. has also been entrusted with duties of identification and notification of sites for common TSDF and publishing periodically inventory of disposal sites as stipulated under Schedule VII of the HOWM Rules, 2016. It has been observed that actions have not been taken on the above (except identification and notification for common TSDFs in few States) by the State/UT Govt. and there is lack of awareness among them in this regard.	5(3) and Schedule VII of the HOWM Rules, 2016. Hon'ble NGT may issue appropriate directions in this regard. (All State/UT Govts.: Immediate)

5. Having regard to the sensitiveness of the issue and impact of non-compliance on environment and public health, the above recommendations need to be fully implemented and monitored by the Chief Secretaries at State Level and by the MoEF&CC and CPCB at national level.

6. The affidavit of CPCB further states that the Committee has not covered all the aspects and certain other aspects which remain to be considered include contaminated site, capacity building of regulators, issues related to import and export of hazardous waste etc. for which further time of six months is required.

7. We are of the view that the Committee must complete its task expeditiously within three months from today. In view of the fact that

two months have already gone by after the affidavit was filed, its final report may now be submitted on or before 31.07.019.

8. It is made clear that if the progress in implementation of the Rules is not found to be adequate, the States may be required to furnish performance guarantees to comply with the Rules in a time bound manner.

9. CPCB may determine the scale of compensation to be recovered for violation of the Rules within one month from today and furnish a report to this Tribunal by-email at ngt.filing@gmail.com. CPCB may furnish final action taken report in the matter on or before 15.08.019 by e-mail at ngt.filing@gmail.com.

10. The Chief Secretaries may look into the issue of capacity building of the SPCBs/PCCs to deal with the issue of compliance of the Rules.

List for further consideration on 26.08.2019.

Adarsh Kumar Goel, CP

Dr. Nagin Nanda, EM

April 12, 2019
Original Application No. 804/2017
(Earlier O.A. No. 36/2012)
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