

**BEFORE THE NATIONAL GREEN TRIBUNAL  
Western Zone Bench, Pune**

**Original Application No. 33 OF 2025 (WZ)**

**IN THE MATTER OF:**

Pathan Fuzailkhan Ashifkhan

**- APPLICANT (S)**

**VERSUS**

Gujarat Pollution Control Board & Ors.

**-RESPONDENT (S)**

**REPLY ON BEHALF OF THE RESPONDENT No. 04**

**: CENTRAL POLLUTION CONTROL BOARD (CPCB)**

1. That, Hon'ble NGT (WZ) vide order dated 07.03.2025 has sought reply of respondents (CPCB is respondent No. 4) in the instant matter. The OA No 33/2025 and details of consideration of the matter by Hon'ble NGT came in notice of CPCB RD Vadodara on 26.03.2025. Thereby, the submission is made in following paragraphs.
2. That, CPCB has been constituted under Section 3 of the Water (Prevention and Control of Pollution) Act, 1974 (hereinafter referred to as "Water Act, 1974"). It performs the functions under the Water Act, 1974, the Air (Prevention and Control of Pollution) Act 1981 (hereinafter referred to as "Air Act, 1981") and the Environment (Protection) Act, 1986 (hereinafter referred to as "E(P) Act, 1986") and the rules made therein. State Pollution Control Board/Pollution Control Committee in every State/Union Territory constituted under section 4 of the Water (Prevention and Control of Pollution) Act, 1974 and section 6 of the Air (Prevention and Control of Pollution) Act, 1981 in the respective State/Union Territory and are responsible for implementation of the provisions of both the Acts.

**PRELIMINARY SUBMISSIONS: -**

3. The matter is related to allegation of applicant against M/s Eco Waste Management, located at Plot No. 201 to 204, GIDC & Village: Palej, Distt.: Bharuch, Gujarat which is a hazardous waste pre-processing facility to prepare fuel for co-processing. It is alleged that the said facility started receiving hazardous waste from industries after obtaining Consolidated Consent & Authorization (CCA) from Gujarat Pollution Control Board (hereafter referred as GPCB)- Respondent No. 1. Presently, huge amount of waste (approximately 800-1000 truck-loads or about 22,500 MT of waste) is accumulated at the site without any treatment.



4. That, the Hon'ble NGT (WZ) in the aforesaid matter vide its orders dated 07.03.2025 has recorded that "2....Learned counsel for the applicant submits that noxious odors are emanating from the accumulated waste, affecting nearby locality, which may lead to fire incidents as well as contamination of ground water etc. Respondent No.1- GPCB has already issued Closure Directions to Respondent No.2- Eco Waste Management (EWM) on 13.09.2023 pursuant to their visit conducted on 08.08.2023, wherein various non-compliances were found.....".
5. That, the Hon'ble NGT (WZ) in the aforesaid matter vide its orders dated 07.03.2025 has recorded that "3....it is apprehended by learned counsel for the applicant that it appears that at the time of grant of CC&A, Respondent No.1-GPCB might not have visited the site and granted the said CC&A to Respondent No.2 blindly. Hence, prayer is made that a direction may be issued for transportation, treatment and disposal of the said hazardous waste using Environmentally Sound Technology (EST) through other HWM-TSDF by GPCB and cost/expenses incurred in this process may be recovered from Respondent No.2....".
6. The applicant has alleged that
  - (i) The storage site lacks adequate fire control measures and impervious concrete floor.
  - (ii) Google Photo of site shows array of tanks from which liquid has already washed out and also leached in the ground.
  - (iii) The summer is approaching and risk of fire is elevated in stored hazardous waste. If such a huge quantity of waste suddenly catches fire, then its products of combustion are unpredictable, unknown and end products can be disastrous, and shall pollute the region much beyond the nearby area.
7. The applicant states that this is substantial issue of environment. There is great threat to environment and human life. This hazardous waste should be transported, stored, treated and disposed of using environmentally sound technology or through other hazardous waste management -TSDFs. The applicant also mentioned about fixing the financial responsibility for disposal of the waste.

**REPLY:-**

8. That, it is humbly submitted that, the concerned SPCB/PCC is responsible for implementation of the provisions of both the Water Act, 1974 and the Air Act, 1981 including Grant/Renewal/Cancellation of Consent to Establish/Operate in the respective State/Union Territory.
9. That, it is humbly submitted that for effective management of hazardous waste, Ministry of Environment Forest and Climate Change has notified Hazardous and Other Wastes



(Management and Transboundary Movement) Rules, 2016 (hereinafter called as HOWM Rules 2016) vide G.S.R No. 395 (E) on 04/04/2016 in supersession of the earlier Hazardous Wastes (Management, Handling and Transboundary Movement) Rules, 2008. As per the prevailing HOWM Rules, 2016, CPCB has been entrusted with responsibility for preparation and updation of guidelines/SOPs for management of hazardous waste. The concerned State Pollution Control Board (SPCB)/Pollution Control Committee (PCC) is the prescribed authority for Grant/Renew/Suspend Authorization including implementation of provisions under the said Rules and CPCB guidelines and also taking action against the violations of these Rules in the respective State/Union Territory.

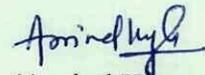
10. That, it is humbly submitted that CPCB in July, 2017 issued "Guidelines for Pre-Processing and Co-Processing of Hazardous and Other Wastes in Cement Plant as per HOWM Rules, 2016 (**Annexure-1**).
11. That, it is humbly submitted that CPCB has obtained status of investigation and action taken in the said matter from the Gujarat Pollution Control Board (GPCB). The information provided by GPCB is summarized below.
  - (i) That, M/s Eco Waste Management, GIDC & Village Palej, Distt. Bharuch, Gujarat established a pre-processing facility for hazardous waste collected from various industries to make it suitable for co-processing in cement plants.
  - (ii) That, M/s Eco Waste Management has taken a piece of land on lease from Mohammad Hanif Kadri in the name of Shri Vangla Vijay Bhaskar Reddy (as mentioned in FIR No.11199039240529 dated 16.10.2024). Reportedly, both the Lessee and Lessor has submitted a notarized joint undertaking dated 04/12/2021 along with the application for CTE and CC&A to GPCB stating that "we Lessor and Lessee both assure you that if any environment damages will happen in the future in unit M/s Eco Waste Management then we both will take joint liability for remediation and compensation". Copy of undertaking is attached as **Annexure-2**.
  - (iii) That, based on the application submitted by the facility and inspection report from Regional Office – GPCB, Bharuch; Consent to Establish (CTE) was granted by GPCB vide order CTE-120569 dated 22/08/2022.
  - (iv) That, subsequently based on the application submitted by the facility and inspection report from Regional Office – GPCB, Bharuch; Consolidated Consent & Authorization (CC&A) was granted by GPCB vide order AWH-127517 valid up to 31/12/2027. Copy of CC&A is attached as **Annexure-3**.
  - (v) That, a complaint was received by GPCB on 08/08/2023 from Shri Bhavesh Thakkar of Sahjananad Dairy stating that M/s Eco Waste Management has started operation adjacent to their dairy due to which strong odor is felt in their premises.
  - (vi) That, the GPCB Regional Office investigated the matter and based on the findings of the inspection report (dated 08/08/2023) of GPCB, Regional Office, Bharuch, GPCB issued Closure Direction vide order dated 13/09/2023 under Section 5 of E(P)A, 1986 to M/s Eco Waste Management for the violations of provisions

contained in Hazardous & Other Waste (Management & Transboundary Movement) Rules, 2016. Copy of Direction is attached as **Annexure-4**.

- (vii) That, complainant Shri Bhavesh Thakkar of Sahajanand Dairy was intimated about the action taken by GPCB vide letter dated 25/09/2023 under intimation to CPCB, New Delhi as the complaint was also received through CPGRAMS from CPCB, New Delhi.
- (viii) That, complaint from Palej Industrial Association dated 18/08/2023 is also received by Regional Manager, GIDC – Ankleshwar about pollution caused by this facility. Subsequently, Chief Officer, Notified Area Authority, GIDC, Palej wrote letter dated 18/08/2023 to the President – Palej Industrial Estate Association for disconnection of water supply of M/s Eco Waste Management.
- (ix) That, Palej Industrial Estate Association disconnected the water supply connection of the facility on 19/08/2023.
- (x) That, Regional Manager, GIDC, Ankleshwar vide a letter dated 18/08/2023 to Regional Officer, GPCB – Bharuch objected installation of the alleged unit in engineering zone of Palej Industrial Estate.
- (xi) That, subsequently, GPCB informed the president -Palej Industrial Association on 25/09/2023 regarding the Closure direction dated 13/09/2023 issued to M/s Eco Waste Management.
- (xii) That, M/s Eco Waste Management applied for revocation of closure direction of GPCB vide letter dated 02/11/2023 (received in GPCB).
- (xiii) That, closure revocation application of M/s Eco Waste Management was rejected by GPCB vide letter dated 01/05/2024 on the grounds listed therein.
- (xiv) That, a letter dated 09/05/2024 was issued by GPCB to M/s Eco Waste Management to take corrective and preventive necessary actions for control of pollution with reference to earlier non-compliance and proper upkeep of waste during period of monsoon.
- (xv) That, CTE & CCA of M/s Eco Waste Management was withdrawn by GPCB vide letter dated 03/06/2024 (**Annexure-5**).
- (xvi) That, Direction under Section 5 of Environment (Protection) Act, 1986 dated 03/06/2024 issued by GPCB to Lessor of the premise for the violations of provisions of Hazardous & Other Waste (Management & Transboundary Movement) Rules, 2016. It was also directed to carry out factual inventory of the material lying within the premises and to immediately dispose it off in environmentally sound and safe manner (**Annexure-6**).
- (xvii) That, as the responsible parties failed to comply with the directions issued, GPCB Regional Officer – Bharuch was asked by Head Office of GPCB, Gandhinagar vide letter dated 03/06/2024 to arrange for disposal of hazardous waste in an environmentally sound manner for which initial expense is to be borne by GPCB and shall be recovered from the responsible parties later as per the applicable provisions.

(xviii) That, GPCB has filed FIR against the facility on 16.10.2024. Copy of FIR is attached as **Annexure-7**.

12. That, as per the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016 an "Occupier" is any person who has control over the affairs of any factory or premises having possession of hazardous and other wastes. Further, under the said Rules the occupier shall be responsible for safe and environmentally sound management of hazardous and other wastes.
13. That the environmentally sound handling and management of hazardous waste stored in the premises of M/s Eco Waste Management, is required.
14. That, Rule 23 of the HOWM Rules, 2016 lays down the provision for Liability of occupier, importer or exporter and operator of a disposal facility for the damages caused to the environment or third part due to improper handling and management of the hazardous and other waste.
15. That, the Authorization granted by SPCBs/PCCs under the HOWM Rules, 2016 includes the General Condition that "The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty." Copy of the aforesaid CPCB guidelines is attached at **Annexure-8**.
16. That, the answering respondent craves reply of the Hon'ble Tribunal to file additional reply, in future, if required.
17. That, in light of the above submission, it is respectfully submitted that this Answering Respondent i.e. CPCB, shall abide by any order(s) or direction(s) passed by this Hon'ble tribunal in the instant OA.



(Arvind Kumar Jha)

Scientist 'E' & RD (Vadodara)  
Central Pollution Control Board

BEFORE THE NATIONAL GREEN TRIBUNAL

Western Zone Bench, Pune

Original Application No. 33 OF 2025 (WZ)

Regd. No. : 14  
Date : 01/04/2025

IN THE MATTER OF:

Pathan Fuzailkhan Ashifkhan

- APPLICANT (S)

VERSUS

Gujarat Pollution Control Board & Ors.

-RESPONDENT (S)

REPLY ON BEHALF OF THE RESPONDENT No. 04: CENTRAL POLLUTION CONTROL BOARD

AFFIDAVIT

I Arvind Kumar Jha, aged 48 years, having office at the Regional Directorate (Vadodara), Central Pollution Control Board (CPCB), Nr. VMC Ward No. 10 Office, High Tension Road, Subhanpura, Vadodara, 390023, do hereby solemnly affirm, declare on oath and state as under:-

1. That the deponent is authorized representative to represent the Respondent CPCB in the present case, and as such, I am well conversant with the facts and circumstances of the present case on the basis of the information derived from the official records, and hence, I am competent and authorized to verify, sign and swear this affidavit on behalf of the Respondent CPCB.
2. That the accompanying reply may be read part and parcel of the present affidavit as I am competent to swear this affidavit.
3. That the Original Application No. No 33/25 and details of consideration of the matter by the Hon'ble Tribunal came in notice of CPCB (RD Vadodara) on 26.03.2025.
4. That the accompanying reply has been drafted and filed under my instructions and the contents thereof are true and correct on the basis of the record maintained during ordinary course of business of CPCB and available records and documents and the contents of the same are read over and explained to me and are not repeated herein for the sake of brevity.

*Arvind Kumar Jha*  
DEPONENT

VERIFICATION

Verified at Vadodara on this ...<sup>st</sup>.....Day of April, 2025 that the contents of the above reply are correct and true on the basis of the record of the cases as mentioned in the day to day affairs of the CPCB. Nothing has been concealed therefrom or mis-stated. Verified at Vadodara on this the ...<sup>st</sup>..... Day of April, 2025.

*Arvind Kumar Jha*  
DEPONENT

**डॉ. अरविंद कुमार झा / Dr. Arvind Kumar Jha**  
क्षेत्रीय निदेशालय / Regional Director  
केंद्रीय प्रदूषण नियंत्रण बोर्ड / CENTRAL POLLUTION CONTROL BOARD  
(पर्यावरण, वन एवं जलवायु परिवर्तन विभाग, भारत सरकार)  
(Ministry of Environment, Forest & Climate Change, Govt. of India)  
क्षेत्रीय निदेशालय, वाडोदरा - 390023, गुजरात  
Regional Directorate, Vadodara - 390023, Gujarat.



Solemnly Affirmed / Declared  
Sworn Before me by *Dr. Arvind Kumar Jha*  
*Malini*  
MALINI AMARSINGH RAWAT  
NOTARY, (Govt. of India) 01/04/2025

My Commission Expires  
on 29/01/2027  
MALINI AMARSINGH RAWAT  
NOTARY (Govt. of India)



Central Pollution Control Board  
PARIVESH BHAWAN  
East Arjun Nagar, Delhi - 110 032

No. B- 33014/7/IPC-II/2017-18/

July 07, 2017

OFFICE MEMORANDUM

Draft Guidelines for Pre-processing/ Co-processing of Hazardous and Other Wastes had been prepared in Feb. 2017 and circulated among the SPCBs / PCCs and other Stake-holders for information/comments. Suggestions were received and have been incorporated wherever feasible. Accordingly, Final Guidelines have been prepared and are enclosed herewith for reference and further necessary action in the matter as deemed fit at the level of industries generating such wastes , SPCBs / PCCs , Pre-processors, Co-processors, TSDF and others concerned.

Reference of the Hazardous and Other Wastes ( Management & Trans-boundary Movement) Rules, 2016 shall also be taken wherever necessary.

This is issued with the approval of the Competent Authority, Central Pollution Control Board.

[N.K. Gupta]  
Divisional Head - IPC-II

Distribution :

- ✓ All the SPCBs / PCCs
- ✓ Cement Manufacturers Association, Noida [U.P.]
- ✓ Confederation of Indian Industries, New Delhi
- ✓ TSDFs

**Guidelines for Pre-Processing and Co-Processing of  
Hazardous and Other Wastes in Cement Plant as per  
H&OW(M & TBM) Rules, 2016**



July, 2017

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

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## 1.0 Background:

The rules notified in the year 2016 on management of Hazardous and Other Wastes, outlines the hierarchy of wastes management, wherein, prevention, minimization, reuse, recycling, recovery, utilisation including pre-processing and co-processing was envisaged prior to considering the option of disposal through incineration or secured landfilling.

Substantial fractions of the industrial, commercial, domestic and other wastes contain materials that have the potential for use as an alternative raw material or as a supplementary fuel for energy recovery. The current waste generation scenario in India is as follows.

- About 7.4 Million tonnes of hazardous wastes is annually generated in India, out of which around 3.98 Million tonnes is recyclable and can be used for resource or energy recovery.
- About 65 Million TPA of MSW is generated in the country which contains about 15-20 % of non-recyclable Segregated Combustible Fraction (SCF) which can be utilized for energy recovery.
- About 200 million tonnes of non-hazardous wastes of industrial origin also gets generated in the country such as fly-ash, pyro-metallurgical slags, sludge from WTPs, dried sewage sludge, Plastic & other packaging materials, date expired and off-specification FMCGs materials and food & kindred products, used pneumatic tyres, etc. having potential for resource or energy recovery.
- Large quantity of agro-wastes that do not have potential to be used as cattle feed etc.

Environmentally sound utilization of wastes for resource or energy recovery can be practiced in various industrial processes. However, utilization by co-processing in cement Kiln is considered as an effective and sustainable option. There is dual benefit in co-processing of wastes in cement kilns, in terms of utilizing the waste as a supplementary fuel as well as an alternative raw material

The production of cement in India is about 300 Million Tons per annum, for which estimated coal and raw material (Lime stone, Iron ore, Clay, Bauxite etc.) requirement are 50 Million Tons per annum and 450 Million Tons per annum, respectively. The country, therefore, has vast potential to utilize large quantum of wastes such as non-recyclable hazardous & other wastes, segregated combustible fractions from MSW or Municipal Solid Wastes (MSW) based Refuse Derived Fuel (RDF), non-hazardous industrial wastes, plastics wastes, tyre wastes, non-usable bio-mass etc. as an alternative fuel and raw material (AFR) in cement kilns. Such utilization would help in recovering energy and material value present in them thereby reducing the consumption of primary fossil fuels and raw materials. Utilising these materials as AFRs will also reduce large quantity of GHG emissions of the country which is in line with our commitment made in the Paris agreement.

Many trial runs for co-processing of different kind of hazardous and other wastes in cement kiln have been conducted as per the technical support provided by CPCB since the year 2005. These wastes have been permitted by CPCB and then authorized by SPCBs to implement regular co-processing in

Guidelines for Pre-Processing and Co-Processing of Hazardous and Other Wastes in Cement Plant as per HOW(M & TBM) Rules, 2016

various cement kilns under Rule 11 of the Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008. CPCB has also published guidelines on co-processing of wastes in cement plants in the year 2010.

Subsequently, these rules have been superseded with re-notification vide GSR 395 (E) dated 04.04.2016 as the Hazardous and Other Wastes (Management and Trans-boundary Movement) Rules, 2016 (HOWM Rules 2016).

The Rule 9 of the HOWM Rules 2016 is reproduced below:

***“Utilisation of hazardous and other wastes.-***(1) *The utilisation of hazardous and other wastes as a resource or after pre-processing either for co-processing or for any other use, including within the premises of the generator (if it is not part of process), shall be carried out only after obtaining authorization from the State Pollution Control Board in respect of waste on the basis of standard operating procedures or guidelines provided by the Central Pollution Control Board.*

(2) *Where standard operating procedures or guidelines are not available for specific utilisation, the approval has to be sought from Central Pollution Control Board which shall be granting approval on the basis of trial runs and thereafter, standard operating procedures or guidelines shall be prepared by Central Pollution Control Board:*

*Provided, if trial run has been conducted for particular waste with respect to particular utilization and compliance to the environmental standards has been demonstrated, authorization may be granted by the State Pollution Control Board with respect to the same waste and utilisation, without need of separate trial run by Central Pollution Control Board and such cases of successful trial run, Central Pollution Control Board shall intimate all the State Pollution Control Board regarding the same.*

(3) *No trial runs shall be required for co-processing of waste in cement plants for which guidelines by the Central Pollution Control Board are already available; however, the actual users shall ensure compliance to the standards notified under the Environment (Protection) Act, 1986 (29 of 1986), for cement plant with respect to co-processing of waste:*

*Provided that till the time the standards are notified, the procedure as applicable to other kind of utilisation of hazardous and other waste, as enumerated above shall be followed.”*

The above provisions have prompted CPCB to bring out these revised guidelines to facilitate SPCBs/PCCs to grant authorisation for utilization of different kinds of wastes, including Hazardous & other wastes, as AFRs through co-processing in cement kilns in an environmentally sound manner.

## 2.0 Benefits of Co-processing:

Co-processing in cement kiln is considered as environmentally sustainable option for the management of different kinds of wastes including hazardous and other wastes. In co-processing, these wastes are not only destroyed at a higher temperature of up to 1450°C and long residence time during which its inorganic content gets fixed with the clinker and becomes part of cement apart from using the energy content of the wastes, thus no residues are left. While in case of incineration, the residual ash requires to be land filled as hazardous waste. Further the acidic gases, if any generated during co-processing gets neutralized in the large alkaline environment available within the kiln system. This phenomenon also reduces the non-renewable resources requirement such as coal and lime stone etc. Thus the utilization of wastes in cement kilns through co-processing provides a win-win option of waste disposal.

Co-processing of wastes in the cement plants would require a large scale management of Hazardous and other wastes. This would mean that a large quantum of waste will be received, stored, handled and pre-processed in the cement plants or TSDFs or stand-alone pre-processing facilities so as to make an homogenised mixture of wastes suitable for co-processing in the cement kilns. This waste mix would get prepared from different kinds of wastes such as the ones listed in HOWM Rules, 2016 and also those which are not listed like SCF, RDF, plastic & other packaging wastes, tyre chips, non-hazardous industrial wastes, biomasses, agro-wastes (which are not suitable for use as cattle feed), non recyclable materials from ware houses such as date expired or off-specification FMCG, food & kindred and other products, etc. Further it may require installation of different systems for feeding such homogenised mixtures into cement kilns. Fig 1 given in Annexure 1 provides an overview of the pre-processing of the waste in a facility and co-processing in cement kiln.

Hence, there is a need to define appropriate methodology with which, necessary authorization can be granted by SPCBs to cement plants or pre-processing facilities apart from TSDFs for collection, transportation, receipt, storage, handling & pre-processing of wastes and also for co-processing operation in cement kilns.

## 3.0 Authorization for pre-processing and/or co-processing:

As per HOWM Rules, 2016, utilisation of hazardous and other wastes for co-processing or for any other use shall be carried out only after obtaining authorization from the State Pollution Control Board in respect of waste on the basis of standard operating procedures or guidelines provided by the Central Pollution Control Board.

Further, no trial runs would be necessary for grant of authorisation for co-processing of wastes in cement kilns since Ministry of Environment, Forests and Climate Change has notified the Emission Standards for co-processing of wastes in cement kiln vide GSR No. 497 (E) dated 10.5.2016 under the Environment (Protection) Rules, 1986. Such co-processing shall be carried out as per the guidelines and SOPs outlined in this document

SPCBs may grant Authorisation to cement plants for co-processing of wastes listed in Schedule I, Schedule II and Schedule III of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. Authorisation for co-processing of commonly recyclable hazardous wastes

Guidelines for Pre-Processing and Co-Processing of Hazardous and Other Wastes in Cement Plant as per HOW(M & TBM) Rules, 2016

listed in Schedule-IV may be considered only if there are no recyclers for such wastes at reasonable distance as may be decided by SPCBs.

Further, SPCBs may also grant consent to the cement plants under Air (P&C) Act, 1981 for co-processing of any wastes not listed in HOWM Rules, 2016 like SCF, RDF, plastic & other packaging wastes, tyre chips, non-hazardous industrial wastes, biomasses, agro-wastes (which are not suitable for use as cattle feed) and date expired or off-specification FMCG and food & kindred other products which are not-recyclable. While co-processing all such wastes including hazardous & other wastes, cements plants shall comply with the emission standards prescribed for co-processing of wastes notified by MoEF&CC vide GSR No. 497 (E) dated 10.05.2016.

Use of wastes for co-processing in cement kilns does not warrant the requirement of EC as per MoEF&CC Notification No. S.O.3518 (E) dated 23.11.2016

As per HOWM Rules, 2016, every person who is engaged in generation, collection, transportation, receipt, storage, and handling of hazardous and other wastes for pre-processing and /or co-processing shall obtain an authorization or its renewal by applying in Form 1 from the State Pollution Control Board / Pollution Control Committee.

Accordingly, cement plants may co-process the pre-processed hazardous wastes received from TSDFs or stand-alone pre-processing facilities or their captive pre-processing facilities only after obtaining such authorization.

Every TSDF or standalone pre-processing facility or cement plant who is engaged in pre-processing of wastes for co-processing shall have minimal requisite infrastructure facilities & operational controls as mentioned below;

S.No	Type of operations	Check-list
i.	Type of packaging	May use liners, Bags Small / Jumbo, Drums, Containers, Bulklers, Tankers, etc. suitable for handling of hazardous wastes as per CPCB guidelines
ii.	Reception	Weighing bridge
iii.	Waste characterisation / qualification	Laboratory
iv.	Storage	Shall install covered sheds with Impervious flooring. Waste shall be stored in storage tanks/Containers/bins. Bulky wastes may be handled on impervious lined flooring under shed.
v.	Equipment for Size reduction	Shredder, Grinder, mixers, Cutter, Hammer, Jaw Crusher, Chipper, Hydro-pulper machines, etc.
vi.	Feed material preparation equipment	Impregnation, Drying, Screening, Crushing, Pelletisation, Granulation, Others
vii.	Moving machinery	Shall use machinery like trucks, Bob cat, Forklifts, loaders, dumpers, Arm handlers, Wheal loaders, Crawler loaders, Telescopic etc.
viii.	sorting equipment	Shall use equipment like Metal detectors, Electro-Magnetic separators, etc.
ix.	Screening material	Shall use equipment such as disc screen, Rotary screen, Trommel screen, Oscillating screens etc.

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S.No	Type of operations	Check-list
x.	Conveyers to transport the material from one to another place	Shall use belt conveyors, Inclined Belt conveyors, Cleated belt conveyors, chain conveyors, bucket conveyors, closed conveyors, pipe conveyors etc
xi.	Feeding arrangements (applicable to cement plants alone)	Weigh feeders (Volumetric and Gravimetric feeding), Apron and Gottwald feeders etc. for liquid, solid and semi-solid waste feeding, including facilities for impregnation of wastes.
xii.	Safety equipment (applicable to cement plants alone)	Rotary Air Lock, Safety shut off gate, Double slide gates are utilized into the feeding mechanism to avoid any back fire due to any pressure build-up into the kiln.
xiii.	Fugitive Emission Control Systems	Fume extraction systems with vacuum ducts connected to Scrubbers / bag filters VOC emission control systems Biological treatment etc. ID fan and stack.
xiv.	Fire protection	Approved by fire safety auditor / fire department should be provided
xv.	Spillage/leachate collection / containment measures.	Shall install collection pits, impervious liners, segregation of storm water drainage systems
xvi.	Electrical fittings / Equipment	Systems shall be designed to handling flammable / explosive materials (If relevant)
xvii.	Odour control	The facility must have appropriate odor control facility to deal with the odor nuisance.
xviii.	Safety Equipment	There shall be provision of emergency showers and eye wash stations. Use of PPEs, ear-plug etc.
xix.	Facility has implemented a monitoring plan for checking the health of the operating personnel as per the statutory requirement	Medical surveillance of the operating personnel as per HOWM Rules 2016
xx.	Emergency Response Plan	Emergency Response Plan to deal with spills, fires and emergencies as per CPCB guidelines
xxi.	CEMS	Shall install CEMS for PM, NO <sub>x</sub> & SO <sub>2</sub> and connected to SPCB / CPCB for online data transmission (applicable to cement plants alone)

TSDFs, Stand alone Pre-processing Facilities & Cement plants shall undertake pre-processing of and co-processing of wastes as per the Standard Operating Procedures (SOPs) specified in these guidelines.

SPCBs shall grant authorisation to the waste generators to send their waste for management to any of the suitable pre-processing or co-processing facility that is approved by the SPCBs.

#### 4.0 Trial Runs

Trial runs for co-processing of hazardous wastes would not be necessary except for few specific wastes such as Persistent Organic Compounds (PoPs), PCBs, obsolete and date expired pesticides, Ozone Depleting Substances

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etc. listed for restrictions in international conventions, for which trial studies were not yet conducted. Kiln specific trial runs may be required for such wastes to study the destruction and removal efficiencies (as per the requirement of Stockholm convention) in the given kiln, compliance to emission standards, safe transport, storage and handling etc. prior to issuance of authorisation by SPCBs. In such cases, SPCBs may consult CPCB for conducting such kiln specific trial studies.

## **5.0 Standard Operating Procedures**

### **5.1 Handling of Hazardous & other wastes:**

The hazardous wastes need to be handled in an environmentally safe manner avoiding the possibilities of contaminating the environment and eliminate the chances of accidents leading to environmental damage. The requirements of handling, including labelling, packaging, transport and storage applicable to the hazardous & other wastes have been described in following sub-sections.

#### **5.1 Responsibilities of occupier for handling of hazardous & other wastes**

“Occupier” in relation to any factory or premises, means a person who has control over the affairs of the factory or the premises and includes in relation to any hazardous waste the person in possession of the hazardous waste.

The occupier shall take all adequate steps while handling hazardous wastes to:

- (a) Contain contaminants and prevent accidents and limit their consequences on human beings and the environment; and
- (b) Provide persons working on the site with the training, equipment and information necessary to ensure their safety.

#### **5.2 Packaging of Hazardous & other wastes:**

The containers utilized for storing and handling Hazardous and other wastes for the purpose of co-processing must be able to withstand normal handling and retain integrity for a minimum period of six months. In general, packaging of hazardous substances must meet the following requirements:

- (i) All packaging materials including containers shall be of such strength, construction and type as not to break open or become defective during transportation.
- (ii) All packaging materials including containers shall be so packed and sealed that spillages of hazardous wastes / substances are prevented during transportation due to jerks and vibrations caused by uneven road surface.
- (iii) Re-packing materials including that used for fastening must not be affected by the contents or form a dangerous combination with them.
- (iv) Packaging material should be such that there will be no significant chemical or galvanic action among any of the material in the package.
- (v) Bulk transportation of hazardous wastes in trucks without suitable packaging or containers shall not be allowed.

- (vi) The containers when used for packaging of the hazardous & other wastes shall meet the following requirements:

Container shall be of mild steel with suitable corrosion-resistant coating and roll-on roll-off cover, which may either be handled by articulated crane or by a hook lift system comfortably for a large variety of wastes. Other modes of packaging, like collection in 22-liter plastic or steel drums, PP and HDPE/LDPE containers, HDPE liner bags etc., also work for variety of waste. However, all such container should be amenable to mechanical handling.

- It should be leak proof.
- In general, the containers for liquid hazardous waste should be completely closed / sealed. There should be no gas generation due to any chemical reaction within the container, and thus should be devoid of air vents.
- Container should be covered with a solid lid or a canvas to avoid emissions of any sort including spillage, dust etc. and to minimize odour generation both at the point of loading as well as during transportation.
- Container used for transportation of waste should be able to withstand the shock loads due to vibration effect/undulations of pavements etc.
- Container should be easy to handle during transportation and emptying.
- As far as possible, manual handling of containers should be minimized. Appropriate material handling equipment is to be used to load, transport and unload the containers. Drums should not be rolled on or off vehicles. Preferably, equipment such as fork lift & pallets shall be used.
- Where a two-tier or three-tier storage is envisaged the frame should have adequate strength to hold the containers. Palletised drums may be stacked not more than 2 layers high in the transport vehicle.
- One-way containers (especially 16-liter drums) are also allowed. The multi-use container should be re-useable provided it should be cleaned and free from deterioration or defects.
- Loads are to be properly placed on vehicles. Hazardous & other waste containers are not to overhang, perch lean or be placed in other unstable base. Load should be secured with straps, clamps, braces or other measures to prevent movement and loss. Design of the container should be such that it can be safely accommodated on the transport vehicle.
- Non-compatible wastes shall not be collected in the same container. These wastes shall be segregated & packed separately. Non-compatible wastes shall not be transported together under any circumstance.

### 5.3 Labelling of Hazardous & other wastes

There are two types of labeling requirements:

- (i) Labelling of individual transport containers (ranging from a pint-size to a tank); and
- (ii) Labelling of transport vehicles.

All hazardous & other waste containers must be clearly marked with the contents. The marking must be irremovable, waterproof and firmly attached. Previous content labels shall be obliterated when the contents are different. Proper marking of containers is essential.

Containers that contain hazardous waste shall be labelled with the words "HAZARDOUS WASTE" in Vernacular language, Hindi / English. The information on the label must include the code number of the waste, the waste type, the origin (name, address, telephone number of generator), hazardous property (e.g. flammable), and the symbol for the hazardous property (e.g. the red square with flame symbol).

The label must withstand the effects of rain and sun. Labelling of containers is important for tracking the wastes from the point of generation up to the final point of disposal. The following are the requirements for labeling:

- The label should contain the name and address of the occupier and facility where it is being sent for pre-processing or co-processing i.e. labelling of container shall be provided with a general label as per Form 8 of the HOWM Rules, 2016.
- Emergency contact phone numbers shall be prominently displayed viz; the phone number of concerned officer of the sender and receiver, Regional Officer of the SPCB / PCC, Fire Station, Police Station and other agencies concerned.

Explanation: As a general rule, the label has to state the origin/ generator of the waste. He / she and only he / she – is responsible and shall know, in case of any accident / spillage etc. what kind of wastes it is, what hazard may occur and which measures should be taken. The second in the line is the collector / transporter / disposer /co-processor / pre-processor, who has to know the risk and what to do to minimize risks and hazards.

### 5.4 Collection and transportation of Hazardous & other wastes

The transportation of the Hazardous wastes has to be undertaken by the transporter who is engaged by either authorised sender or receiver. The responsibility of safe transportation of hazardous & other waste to the site for pre-processing or co-processing shall rest with either waste generator or the occupier of the pre-processing / co-processing facility that engages the transporter for the waste transportation. The detailed guidelines for collection and transportation of hazardous and other wastes have been provided at **Annexure-2**.

## 5.5 Storage of Hazardous & other wastes

The storage period of hazardous and other wastes shall be in accordance with the Rule 8 of the Hazardous & Other wastes (Management and Transboundary Movement) Rules 2016. The minimal requisite facilities for storage of hazardous and other wastes are given at **Annexure-3**.

### 5.5 Waste reception

Waste Characterization plays an important part in any treatment process of the waste which may be required before pre-processing and ultimately co-processing into the cement kilns. Upon receipt of the waste, it shall be weighed and properly logged. It shall then undergo a visual inspection to confirm the physical appearance. A representative sample of the waste shall be collected and send to the onsite laboratory for finger printing analysis. Finger print analysis is performed to confirm that a particular waste stream belongs to an offsite waste generation source or not, based on its characteristics. The results of the finger printing analysis should be compared with the results of earlier analysis. Upon confirmation, this shall then be sent for pre-processing or co-processing.

The operator of the pre-processing facility of the cement plant shall perform following finger print analysis for each of the consignment of waste received for pre-processing or co-processing from generation site;

- Moisture content,
- Ash content,
- Net Calorific Value (NCV),
- Chloride and Sulphur content.
- Chemical compatibility
- Any other specific parameter, which may be decided on merit of each case keeping the clinker production process in focus.
- In case of liquid samples, viscosity, pH, suspended particle content etc shall also be performed.
- Heavy metal analysis, Reactive Sulphide, Reactive Cyanide or Halide analysis should be performed if sample comes from a sector which is suspected to have these in the waste material.

The results of this finger print analysis confirm that the waste belongs to already tested and verified waste stream which is suitable for co-processing into the kiln and do not have any side effects on clinker and cement quality parameters.

As the main product of the kiln is clinker, there must not be any side effect on its quality while utilizing the waste streams as AFRs. For pre-qualification for co-processing or pre-processing, a representative sample should be collected from the waste generator's site and analysed in a laboratory for above said parameter which shall form basis for comparing the finger print analysis of the waste consignments.

Quality Control - The quality of the pre-processed wastes (AFRs) largely depends on the quality control process followed during the quality assessment stage. Starting from sampling like collection of a representative sample, its storage in suitable container, avoiding any adulteration during transportation to lab, sample preparation in lab, performing test as per BIS standards for different quality parameters and carefully observing, recording and comparing

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the results for specific waste streams is the key to define and confirm its suitability for pre-processing / co-processing in to the cement kiln.

Samples of wastes received at the pre-processing facility or the cement plant for pre-qualification must be preserved for one year for traceability considerations.

Samples of waste collected from regular consignments for finger print analysis must be preserved for one month for traceability consideration.

Samples that are beyond times as mentioned above must be sent to the TSDF or standalone pre-processing facility or to the cement plant for ensuring its disposal through co-processing.

## 5.6 Acceptance process for Hazardous & other wastes

Appropriate knowledge of the hazardous and other wastes is necessary to ensure that it will not adversely affect the process, safety or environment while handling it during pre-processing or co-processing. Hence, appropriate characterization of the waste for its acceptance and safe handling is an essential requirement.

Characterization of Hazardous and other waste for acceptance comprises two stages: pre-acceptance (or screening) and on-site acceptance. Pre-acceptance involves the provision of assessing the representative samples of the waste to allow operators to determine suitability of the infrastructure to handle the waste before receiving the same in the facility. The second stage concerns procedures when the waste arrives at the facility to confirm previously approved characteristics.

Failure to adequately screen waste samples prior to acceptance and a confirmation of its composition on arrival at the installation may lead to subsequent problems, inappropriate storage, mixing of incompatible substances, and accumulation of wastes could occur.

Hence, the pre-processing / co-processing facility must have appropriate laboratory facility for characterizing solid, liquid and sludge wastes with qualified analysts to ensure that proper waste acceptance process is practiced. This laboratory shall be equipped with facilities to test Moisture, Calorific value, Ash, Chlorine, Fluorine, Carbon, Hydrogen, Sulphur, Nitrogen, Phosphorous, alkali and heavy metals, flash point, mixing compatibility, reactive sulphide, reactive Cyanide or halides etc.

In case the waste received at cement plant or standalone pre-processing facility does not meet the required criteria, in such case, the receiver should make arrangement for transfer of such waste to TSDF for final disposal by adopting necessary manifest system.

## 6.0 Pre-processing of wastes for co-processing:

Due to the heterogeneity of wastes, pre-processing is required to produce a relatively uniform waste stream for co-processing in cement kilns. This waste stream should comply with the technical and administrative requirements of cement manufacture and guarantee that emission standards and product quality are met. The proposal in this regard shall be submitted to SPCB by the cement plant or standalone pre-processing facility or TSDF. Waste mix having

uniform characteristics needs to be prepared from different waste streams for trouble free co-processing in a cement kiln.

The characteristics of the waste mix that need to be uniform pertain to particle size, chemical composition and heat content. For optimum operation, kilns require very uniform waste mix flows in terms of quality and quantity. Uniform quality of waste mix can be achieved by pre-processing different types of wastes by different physical processes in a pre-processing facility.

Pre-Processing is defined as pre-treatment of waste streams coming from different sectors and industries to make it suitable/homogenised for feeding into the kiln system to avoid process fluctuations. Pre-processing involves only physical transformations like size reduction (By Shredding and cutting), separation of foreign/undesirable materials (magnetic materials separation by Magnetic separator, use of metal detectors to remove metallic particles), impregnation (introducing and proper mixing of biomass/saw dust in semi solid streams to soak extra flowing liquids & maintaining good flow ability) and desired size selection (Size selection by screening operation, manual size selection by handpicking of large material size on very low speed Belt conveyors).

Pre-processing produces a homogenised Alternative Fuel mix from different incoming waste streams from various industrial sectors and reduces the possibilities of process fluctuations during Co-Processing the pre-processed fuels.

Various types of equipment are utilized during pre-processing operations like Shredder, Grinder, Cutter, Hammer, Jaw Crusher, Chipper and Hydro pulper machines for size reduction. Mixers for homogenizing the waste mix into large vessels/pits. Moving machinery like trucks, Bob cat, Forklifts, loaders, dumpers, Arm handlers, Wheel loaders, Crawler loaders, Telescopic handlers etc for material movement from one to another place and loading unloading of the material. Metal detectors, Electro-Magnetic separators, metal sorting equipments are utilized to remove small metallic traces which may be present into the incoming hazardous and other wastes from various sources. Different type of screens like Disc screen, Rotary screen, Trommel screen, Oscillating/vibrating screens are used to separate the differently sized portions of the processed waste and choosing the right fraction for feeding into the system. Various types of Belt conveyors like flat belt conveyors, Inclined Belt conveyors, Cleated belt conveyors, chain conveyors, bucket conveyors, closed conveyors, pipe conveyors etc are utilised to transport the material from one to another place, usually pre-processed waste from the processing area to feeding area.

The pre-processing facility must have appropriate design to ensure that the waste homogenization operation is carried out in an environmentally sound manner and has equipment & facilities that are designed to handle the required hazardous wastes.

The rejects produced from the pre-processing facility, if any, may be sent to the TSDF, the authorisation for which may be obtained from concerned SPCB.

The pre-processing area must have impervious concrete floor and should be adequately covered to avoid exposure of rain to the material being stored and handled while pre-processing or co-processing.

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Fume extraction systems with vacuum ducts and fume hoods should be installed at receiving pits/tanks, mixing units, blending units, shredders, transfer points, dryers, impregnation units, granulators, pelletizers, crushers, grinders, blenders etc. where there is source of such emissions. Such fume extraction systems should be connected to scrubbers / bag filters / VOC emission control through carbon adsorption, thermal or biological treatment etc. depending on type of emissions. The cleaned gases should be vented through ID fan and stack.

A fire protection system of approved design should be in place in the storage and pre-processing area.

The storage, handling and pre-processing facility should have appropriate spillage / leachate collection and storage system with impervious liners to avoid contamination of the ground water and soil.

The storm water and spillage / leachate drainage systems should be so designed that there should be no contamination of the storm water with the spillage or leachate from the storage, handling and pre-processing area.

The electrical and instrumentation fitting should be conforming to the standards.

The facility must have appropriate odor control facility to deal with the odor nuisance.

Emergency showers and eye wash stations should be provided within the storage, handling and pre-processing work area for immediate emergency use following exposure to the wastes.

Abatement techniques should be in place for control of noise to required levels.

## 7.0 Co-processing of wastes in Cement kiln:

Co-processing is defined as the use of waste as raw material, or as a source of energy, or both to replace natural mineral resources (material recycling) and fossil fuels such as coal, petroleum and gas (energy recovery) in industrial processes, mainly in energy intensive industries (EII) like cement production. In Co-processing, the combustible waste is utilized as fuel (Alternative Fuels) into the kiln system for maintaining the high temperature during clinker production. Some of the waste streams like biomass, small quantity waste streams, etc which have suitable quality parameters may be directly fed into the kiln system. However, majorly waste streams, especially when volumes are more, are fed after pre-processing which make it homogenized to reduce the process fluctuations.

Various equipment are utilized for feeding the pre-processed AFR into kiln system. Automated mechanical extraction machines such as walking Floor and various belt conveyors as mentioned above are utilized for transporting material from processing area to feeding point. Different kinds of volumetric and gravimetric dosing machinery are utilized for feeding the AFR material into the kiln in a controlled manner. Various safety equipments like Rotary Air Lock, Safety shut off valves & gates & Double slide gates are utilized into the

feeding mechanism to avoid any back fire due to pressure build-up inside the kiln. Bag filters are utilised at transfer points to avoid any dust emission into the atmosphere in case of feeding fine AFRs.

For optimal performance (co-processing without additional emissions), waste materials (pre-processed or as received) should be fed to the cement kiln through appropriate feed points, in adequate proportions and with proper waste quality and emission monitoring systems.

Different feed points can be used to feed the waste materials into the cement kiln for co-processing. The most common ones are:

- Main burner at the rotary kiln outlet end
- Rotary kiln inlet end
- Pre-calciner
- Mid kiln (for long dry and wet kilns)

Appropriate feed points have to be selected according to the physical, chemical and toxicological characteristics of the waste materials. Wastes of high calorific value have to be always fed into the high temperature combustion zones of the kiln system. Wastes containing stable toxic components and also wastes containing more than 1.5% chlorine should be fed to the main burner to ensure complete combustion in the high temperature and long retention time.

Alternative raw materials containing constituents that can be volatilized at operating temperatures in the pre-heater system have to be fed into the high temperature zones of the kiln system.

Coal feeding circuit and raw material feeding circuits of the cement plant must not be utilised to feed any type of wastes for co-processing unless a trial is performed to demonstrate the suitability of the same and specific approval from the SPCB is obtained along with the authorisation. SPCBs may consult CPCB in specific cases in this regard.

Feeding of alternative raw materials containing volatile (organic and inorganic) components to the kiln via the normal raw meal supply should be avoided unless it has been demonstrated by trial runs in the kiln that there is no VOC emission from the stack. Such trial runs should be carried out with permission from SPCBs. SPCB should consult CPCB if they feel that trial is needed in specific difficult cases.

Destruction of waste materials that are covered under the Stockholm convention and Montreal Protocol such as PCBs, Expired or obsolete pesticides, Ozone Depleting Substances etc. must however be undertaken in a given kiln only after obtaining specific approval from SPCB and other concerned organisations. For this, SPCB in consultation with CPCB will provide steps to be followed including implementing a trial as per a defined protocol.

### 7.1 Suitability of Substances for co-processing:

The decision on what type of substances can be used is based on the clinker production processes, the raw material and fuel compositions, the feeding points, the air pollution control devices and the given waste management

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problems. The Accept - Refuse Chart in **Annexure-4** could be used by plant operators to help them in considering, which type of substance is suitable for co processing.

As a basic rule, waste accepted for co-processing must be safe enough to handle in the given facility and shall contribute to recovery of material or energy value present in it or provide its safe disposal.

Sometimes, some waste streams are not suitable in large volumes but can be co-processed in small volumes with controlled feed rate into the system.

The wastes listed below are normally not recommended till otherwise proved / evidenced for and hence need not be considered for pre and co-processing.

- Biomedical waste
- Asbestos containing waste.
- Electronic scrap.
- Entire batteries.
- Explosives.
- Corrosives.
- Mineral acid wastes.
- Radioactive Wastes.
- Unsorted municipal garbage.

## 7.2 Operating Conditions:

Cement plants shall ensure to prevent waste feed in following conditions;

- i. at start up, until the temperature of 850°C in calciner or 1100°C at kiln inlet as the case may be.
- ii. Whenever the temperature of 850°C or 1100°C as the case may be is not maintained.
- iii. Whenever emission monitoring show that any emission limits value is exceeded due to disturbances or failures of air pollution control devices.
- iv. In case of disturbed process condition in the kiln

The management of the pre and co-processing plant shall be in the hands of a skilled person, competent to manage the hazardous waste in an environmentally sound manner.

## 8.0 Emission standards:

The cement kilns undertaking co-processing of the different wastes as above must comply with the following notified emission standards notified vide GSR 497 (E) dated 10.5.2016;

S. No. (1)	Industry (2)	Parameter (3)	Standards (4)		
10A.	Cement Plant with co-processing of wastes	<b>A- Emission Standards</b>			
		Rotary Kiln – with co-processing of Wastes			
			<b>Date of Commissioning</b> (a)	<b>Location</b> (b)	<b>Concentration not to exceed, in mg/Nm<sup>3</sup></b> (c)
		Particulate Matter (PM)*	on or after the date of notification (25.8.2014)	anywhere in the country	30
			before the date of notification (25.8.2014)	critically polluted area or urban centres with population above 1.0 lakh or within its periphery of 5.0 kilometer radius	30
				other than critically polluted area or urban centres	30
		SO <sub>2</sub> *	irrespective of date of commissioning	anywhere in the country	100, 700 and 1000 when pyritic sulphur in the limestone is less than 0.25%, 0.25 to 0.5% and more than 0.5% respectively.
		NO <sub>x</sub> **	After the date of notification (25.8.2014)	anywhere in the country	(1) 600
			Before the date of notification (25.8.2014)	anywhere in the country	(2) 800 for rotary kiln with In Line Calciner (ILC) technology.
					(3) 1000 for rotary kiln using mixed stream of ILC, Separate Line Calciner (SLC) and suspension pre-heater technology or SLC technology alone or without calciner.
		HCl	10 mg/Nm <sup>3</sup>		
		HF	1 mg/Nm <sup>3</sup>		
		TOC	10 mg/Nm <sup>3</sup> **		
		Hg and its compounds	0.05 mg/Nm <sup>3</sup>		
		Cd +Tl and their compounds	0.05 mg/Nm <sup>3</sup>		
		Sb+As+Pb+Co+Cr+Cu+Mn+Ni+V and their compounds	0.5 mg/Nm <sup>3</sup>		
		Dioxins and Furans	0.1 ngTEQ/ Nm <sup>3</sup>		

Continuous Emission Monitoring System (CEMS) should be installed & functioning for the parameters PM, SO<sub>2</sub> and NO<sub>x</sub> in the first phase and the data should be uplinked to CPCB and SPCB servers. Additional emission parameters for CEMS may be added in future as per the directions of CPCB or SPCBs from time to time.

Other parameters shall be monitored manually once in a year and data should be submitted to SPCBs/CPCB.

SPCB / PCC shall monitor the emission from the cement plant to verify the compliance of notified emission standards. In case, SPCB/PCC does not have

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the emission monitoring facilities, they can engage any EPA recognized / NABL accredited laboratory for the purpose.

## 9.0 Procedure for obtaining Authorisation

For co-processing of hazardous and other wastes, cement plants shall obtain Consent to Establish (CTE) and Consent to Operate (CTO) prior to obtaining authorisation under HOWM Rules, 2016.

The proposal for co-processing may include any kind of hazardous & other waste (as listed in the Schedules of HOWM rules, 2016) and non-hazardous wastes such as segregated combustible fractions from MSW, Refuse Derived Fuel (RDF) from MSW, Plastic wastes, Tyre chips, biomasses, food and other products, agro-wastes etc. with exceptions as described in section 7.1 of this guidelines.

The cement plants /standalone pre-processing facilities / TSDFs shall have valid authorisation for receiving, transporting, handling, storing, pre-processing or co-processing of hazardous and other wastes, for which they shall apply for authorisation as per Form 1 of HOWM Rules, 2016.

Application for authorisation shall provide details of the infrastructure available at their end to receive, characterize, transport, handle, store, pre-process and co-process wastes with minimum requisite facilities as specified in section 3.0 and 6.0 of these guidelines.

SPCB / PCC shall undertake physical inspection and verify the required equipment for pre-processing and co-processing of hazardous and other wastes. Format for verifying adequacy of the infrastructure for Pre-processing / Co-processing of waste materials is given below;

### Format for verifying adequacy of the infrastructure for Pre-processing / Co-processing of waste materials

S.No	Type of operations	Check-list
i	Nature of the waste materials applied for	<ul style="list-style-type: none"> <li>a. Solid</li> <li>b. Liquid</li> <li>c. Sludge</li> <li>d. Gas</li> <li>e. Hazardous</li> <li>f. Non-Hazardous</li> <li>g. Flammable</li> <li>h. Toxic</li> <li>i. Corrosive</li> <li>j. Explosive</li> </ul>
ii	Type of packaging	<ul style="list-style-type: none"> <li>a. Liners</li> <li>b. Bags Small / Jumbo</li> <li>c. Drums</li> <li>d. Containers</li> </ul>

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S.No	Type of operations	Check-list
		e. Bulkers f. Tankers g. Other (pl specify)
iii	Type of material handled	a. Solids b. Liquids c. Sludges d. Gases e. Flammable f. Toxic g. Corrosive
iv	Reception	Weighing bridge
v	Type packaging	Loose Bags Drums Containers Bulkers Tankers
vi	Laboratory for Waste characterisation	a. Yes b. No
vii	Storage	Covered sheds Impervious flooring Storage tanks/Containers/bins
viii	Equipment for Size reduction	Shredder, Grinder, mixers, Cutter, Hammer, Jaw Crusher, Chipper, Hydro-pulper machines others (pl. specify)
ix	Feed material preparation equipment	Impregnation Drying, Screening Crushing Pelletisation

S.No	Type of operations	Check-list
		Granulation Others
x	Moving machinery	like trucks, Bob cat, Forklifts, loaders, dumpers, Arm handlers, Wheel loaders, Crawler loaders, Telescopic
xi	sorting equipment	Metal detectors, Electro-Magnetic separators, etc.
xii	Screening material	Disc screen, Rotary screen, Trommel screen, Oscillating screens etc.
xiii	Conveyers to transport the material from one to another place	belt conveyors, Inclined Belt conveyors, Cleated belt conveyors, chain conveyors, bucket conveyors, closed conveyors, pipe conveyors etc
xiv	Feeding arrangements	Weigh feeders (Volumetric and Gravimetric feeding), Apron and Gottwald feeders etc. for liquid, solid and semi-solid waste feeding.  Facilities for impregnation of wastes.
xv	Safety equipment	Rotary Air Lock, Safety shut off gate, Double slide gates are utilized into the feeding mechanism to avoid any back fire due to any pressure build-up into the kiln.
xvi	Fugitive Emission Control Systems	Fume extraction systems with vacuum ducts  Scrubbers / bag filters /  VOC emission control systems  Biological treatment etc.  ID fan and stack.
xvii	Fire protection	Yes
	Approved design should be provided	No

S.No	Type of operations	Check-list
xviii	Spillage/leachate collection / containment measures.  Collection pits, impervious liners, segregation of storm water drainage systems	Yes  No
xix	Electrical fittings / Equipment / Systems are designed to handle flammable / explosive materials (If relevant)	Yes  No
xx	Odour control  The facility must have appropriate odor control facility to deal with the odor nuisance.	Yes  No
xxi	Safety Equipment  Provision of emergency showers and eye wash stations,  PPEs, ear-plug etc.	Yes  No  Remarks:
xxii.	Facilities implemented at the location have been approved by the office of the Factory Inspector	Yes  No
xxiii.	Facility has implemented a monitoring plan for checking the health of the operating personnel as per the statutory requirement	Yes  No
xxiv.	Facility has prepared an Emergency Response Plan	Yes  No
xxv.	CEMS installed for PM, NOx & SO <sub>2</sub> and connected to SPCB / CPCB for	a. Yes  b. No

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S.No	Type of operations	Check-list
	online data transmission	

SPCBs shall attach the verified check-list to their inspection report. In case of refusal, SPCB shall communicate the reasons for the same.

SPCBs may also grant authorization for utilization of chemical gypsum, stabilized jarosite, other similar waste material having potential to be used as set retarder and other high volume low-effect wastes as specified under HOWM Rules, 2016 in cement mill, for which cement plant shall apply to SPCB in form 1. Cement plant shall provide details of the infrastructure available at their end to receive, characterize, transport, handle, store, pre-process and utilize wastes and illustrate their suitability to manage these wastes in an environmentally sound and safe manner with requisite facilities given in section 3.0 and 6.0 as applicable.

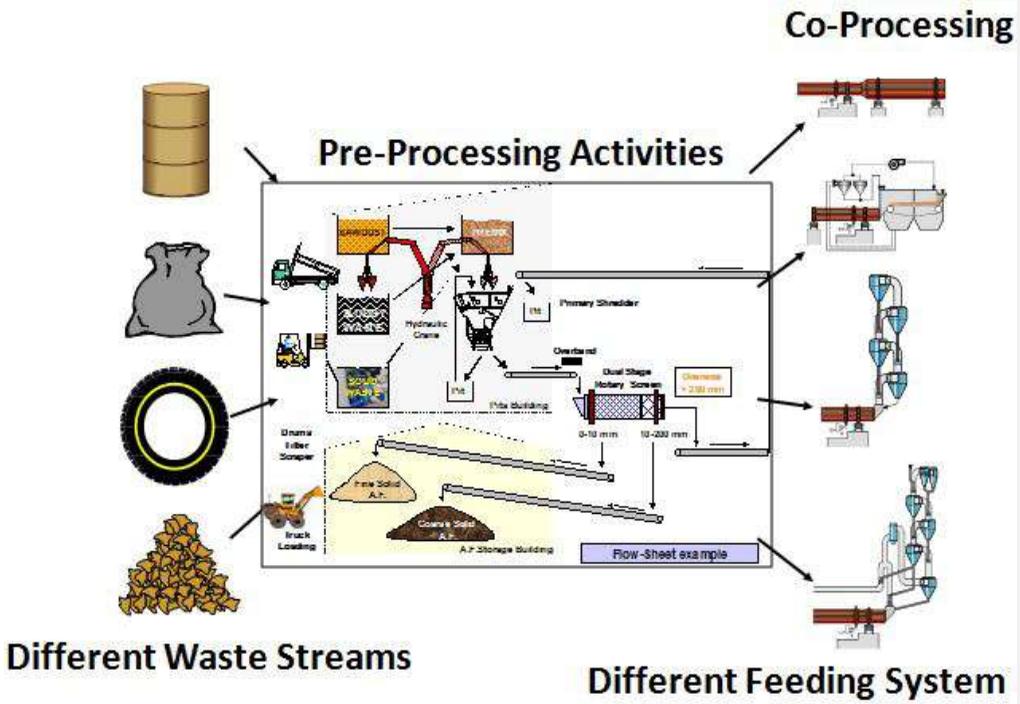
Waste generator shall also obtain authorisation for sending chemical gypsum, stabilized jarosite, and other high volume low-effect wastes as specified under HOWM Rules, 2016 for utilization in cement mill.

Before undertaking pre-processing or co-processing of a waste stream which were introduced for co-processing or pre-processing, the facility operator shall give intimation to SPCB / PCC as per the format given at Annexure - 5

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## Annexure 1

### Schematic Representation of Pre and Co-Processing in Cement Kiln



## Collection & Transportation of Hazardous Wastes

The occupier of the hazardous waste shall ensure that wastes are packaged in a manner suitable for safe handling, storage and transport as specified in section 5.2 of these guidelines. Labeling on packaging is readily visible and material used for packaging shall withstand physical conditions and climatic factors as specified in Section 5.3.

In case of transportation of hazardous and other waste, the responsibility of the safe transport shall be either of the sender or the receiver whosoever arranges the transport and has the necessary authorization for the transport from the concerned State Pollution Control Board. The authorization for the transport shall be obtained either by the sender or the receiver on whose behalf the transport is being arranged. This responsibility should be clearly indicated in the manifest. Thus the occupier involved in transportation of hazardous wastes for co-processing or pre-processing shall comply with the following requirements;

- (a) Ensure that information regarding characteristics of wastes particularly in terms of being corrosive, reactive, Ignitable or toxic is provided on the label.
- (b) The transport of hazardous waste containers shall be in accordance with the provisions of the Hazardous and other Wastes (Management and Transboundary Movement) Rules, 2016, (herein after referred as HW (M & TBM) Rules) and the rules made by the Central Government under the Motor Vehicle Act, 1988 and other guidelines issued from time to time.
- (c) Provide the relevant information in Form 9 to the transporter, regarding the hazardous nature of the waste and measures to be taken in case of an emergency and shall mark the hazardous wastes containers as per Form 8.
- (d) All hazardous waste containers shall be provided with a general label as given in Form 8 of the HW (M& TBM) Rules.
- (e) Intimate both the State Pollution Control Boards before handing over the waste to the transporter. In case of transportation of hazardous through a State other than the State of origin and destination, the sender shall give prior intimation to the concerned State Pollution Control Board of the States of transit before handing over the hazardous wastes to the transporter.
- (g) Manifest System shall be applicable for movement of wastes within the country only
- h) The sender of the waste shall prepare seven copies of the Manifest in Form 10 comprising of colour code indicated below and all seven copies shall be signed by the sender:

Copy number with colour code	Purpose
Copy 1 (White)	To be forwarded by the sender to the State Pollution Control Board or Committee after signing all the seven

	copies.
Copy 2 (Yellow)	To be retained by the sender after taking signature on it from the transporter and the rest of the five copies to be carried by the transporter.
Copy 3 (Pink)	To be retained by the receiver (actual user or treatment storage and disposal facility operator) after receiving the waste and the remaining four copies are to be duly signed by the receiver.
Copy 4 (Orange)	To be handed over to the transporter by the receiver after accepting waste.
Copy 5 (Green)	To be sent by the receiver to the State Pollution Control board/Committee.
Copy 6 (Blue)	To be sent by the receiver to the sender.
Copy 7 (Grey)	To be sent by the receiver to the State Pollution Control Board of the sender in case the sender is in another State.

**Note:**

- i. *The sender shall forward copy 1 (white) to the State Pollution Control Board, and in case of hazardous waste is likely to be transported through any transit State, the sender shall intimate State Pollution Control Boards of the transit States about the movement of the waste.*
  - ii. *No transporter shall accept waste from the sender for transport unless it is accompanied by signed copies 3 to 7 of the manifest.*
  - iii. *The transporter shall submit copies 3 to 7 of the manifest duly signed with date to the receiver along with the waste consignment.*
  - iv. *The receiver after acceptance of the waste shall hand over copy 4 (orange) to the transporter and send copy 5 (green) to his State Pollution Control Board and send copy 6 (blue) to the sender and the copy 3 (pink) shall be retained by the receiver.*
  - v. *The copy 7 (grey) shall only be sent to the State Pollution Control Board of the sender, if the sender in another State.*
- i) The transporter engaged for transportation of hazardous wastes for co-processing meets the following requirements;
- i) Vehicle used for transportation shall be in accordance with the provisions under the Motor Vehicle Act, 1988, and rules made thereunder.
  - ii) Transporter shall possess requisite copies of the certificate (valid authorization obtained from the concerned SPCB/PCC for transportation of waste by the waste generator and operator of a facility) for transportation of hazardous waste.
  - iii) Transporter should have valid "Pollution under Control Certificate" (PUCC) during the transportation of hazardous waste and shall be properly displayed.

Guidelines for Pre-Processing and Co-Processing of Hazardous and Other Wastes in Cement Plant as per HOW(M & TBM) Rules, 2016

- iv) Vehicle shall be painted preferably in blue colour with white strip of 15 to 30 cm width running centrally all over the body. This is to facilitate easy identification.
- v) Vehicle should be fitted with mechanical handling equipment as may be required for safe handling and transportation of the wastes.
- vi) The words "HAZARDOUS WASTE" shall be displayed on all sides of the vehicle in Vernacular Language, Hindi and English.
- vii) Name of the facility operator or the transporter, as the case may be, shall be displayed.
- viii) Emergency phone numbers and TREM Card in Form 9 of HW (M & TM) Rules, 2016.
- ix) Vehicle shall be fitted with roll-on /roll-off covers if the individual containers do not possess the same.
- x) Carrying of passengers is strictly prohibited and those associated with the waste haulers shall be permitted only in the cabin.
- xi) Transporter shall carry documents of manifest for the wastes during transportation as required under Rule 19 of the HW (M & TBM) Rules.
- xii) The trucks shall be dedicated for transportation of hazardous wastes and they shall not be used for any other purpose.
- xiii) Each vehicle shall carry first-aid kit, spill control equipment and fire extinguisher.
- xiv) Hazardous Waste transport vehicle shall run only at a speed specified under Motor Vehicle Act in order to avoid any eventuality during the transportation of hazardous waste.
- xv) Educational qualification for the driver shall be minimum of 10<sup>th</sup> pass (SSC). The driver of the transport vehicle shall have valid driving license of heavy vehicles from the State Road Transport Authority and shall have experience in transporting the chemicals.
- xvi) Driver (s) shall be properly trained for handling the emergency situations and safety aspects involved in the transportation of hazardous wastes. He should be aware of procedures outlined in Emergency Response Plan and trained on emergency spill control procedures.
- xvii) The design of the trucks shall be such that there is no spillage during transportation.

## **Responsibilities of the hazardous waste Transporter**

The sender or receiver whoever is involved in transportation of hazardous wastes shall be responsible for:

- i) Obtaining requisite authorization from SPCB/PCC for transport of hazardous waste (in addition to any other permission that may be required under the Motor Vehicle (Amendment) Act of 1981).

Guidelines for Pre-Processing and Co-Processing of Hazardous and Other Wastes in Cement Plant as per HOW(M & TBM) Rules, 2016

- ii) The transport vehicles shall be designed suitably to handle and transport the hazardous wastes of various characteristics.
- iii) The transporting should follow all the Rules pertaining to transportation of hazardous waste as stipulated under HW (M& TM) Rules,2016.
- iv) Transporting the wastes in closed container at all time.
- v) Delivering the wastes at designated points only.
- vi) Informing SPCB/PCC in Form 11 of the HW (M & TBM) Rules, or local authority, occupier / operator of a facility, and others concerned immediately in case of spillage, leakage or other accidents during transportation.
- vii) The transporter shall train the driver with regard to the emergency response measures to be taken during the transportation of waste.
- viii) Cleaning of vehicles shall be carried out at designated places as authorized by SPCB/PCC.
- ix) Clean-up in case of contamination - 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 cement plant responsible for transportation of hazardous waste shall develop Emergency Response Plan (ERP) as stipulated in "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty" published by CPCB.

# 110

Guidelines for Pre-Processing and Co-Processing of Hazardous and Other Wastes in Cement Plant as per HOW(M & TBM) Rules, 2016

## Letter of Intimation

The letter of intimation to SPCBs in case of sending wastes for co-processing from one State to another State is given below:

Date : \_\_\_\_ \_\_\_\_ 201\_\_

To,

State Pollution Control Board / Pollution Control Committee  
(Belonging to State in which waste generator is located)

\_\_\_\_\_  
\_\_\_\_\_

Subject : Letter of intimation for sending our wastes for co-processing located in another state.

This is to inform you that we have finalized arrangement with \_\_\_\_\_ (Name of the cement plant) to send our following hazardous & other wastes to them for undertaking co-processing. This cement plant is located in the State of \_\_\_\_\_.

1. \_\_\_\_\_ HW Category no. \_\_\_\_\_.
2. \_\_\_\_\_ HW Category no. \_\_\_\_\_.
3. \_\_\_\_\_ HW Category no. \_\_\_\_\_.

The route of the vehicle transporting these wastes will be passing through following states.

- 1.
- 2.
- 3.

We agree to maintain appropriate date wise & waste wise records of transport and receipt of the same at the receiving cement plant for your kind review as per the need.

Further, as mandated by the rules, we agree to file returns to you towards the co-processing of all the Hazardous Wastes carried out in our facility on an yearly basis.

Yours faithfully,

(Authorised Signatory)

Copy to SPCB / PCC (Receiving state)

Copy to SPCB / PCC (in between states)

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### **Storage And Handling Requirements For Hazardous And Other Wastes**

The minimum requirements for ensuring safe storage of hazardous and other wastes at TSDFs / Cement Plants / Standalone Pre-processing facilities shall be as below.

#### **Storage Sheds**

- i. Flammable, ignitable, reactive and non-compatible wastes should be stored separately and never should be stored in the same storage shed.
- ii. Storage area may consist of different sheds for storing different kinds of hazardous wastes and these sheds should be provided with suitable openings.
- iii. Adequate storage capacity (i.e. 25% of the annual capacity of the hazardous waste utilization as a supplementary resource or for energy recovery, or after processing) should be provided in the premises.
- iv. Storage area should be designed to withstand the load of material stocked and any damage from the material spillage.
- v. Storage area should be provided with the flameproof electrical fittings and it should be strictly adhered to.
- vi. Automatic smoke, heat detection system should be provided in the sheds. Adequate fire fighting systems should be provided for the storage area, along with the areas in the facility.
- vii. There should be at least 15 m distance between the storage sheds.
- viii. Loading and unloading of wastes in storage sheds should only be done under the supervision of the well trained and experienced staff.
- ix. Fire break of at least 04 meter between two blocks of stacked drums should be provided in the storage shed. One block of drum should not exceed 300 MT of waste.
- x. Minimum of 1 meter clear space should be left between two adjacent rows of pallets in pair for inspection.
- xi. The storage and handling should have at least two routes to escape in the event of any fire in the area.
- xii. Doors and approaches of the storage area should be of suitable sizes for entry of fork lift and fire fighting equipment;
- xiii. The exhaust of the vehicles used for the purpose of handling, lifting and transportation within the facility such as forklifts or trucks should be fitted with the approved type of spark arrester.
- xiv. In order to have appropriate measures to prevent percolation of spills, leaks etc. to the soil and ground water, the storage area should be provided with concrete floor or steel sheet depending on the

characteristics of waste handled and the floor must be structurally sound and chemically compatible with wastes.

- xv. Measures should be taken to prevent entry of runoff into the storage area. The Storage area shall be designed in such a way that the floor level is at least 150 mm above the maximum flood level.
- xvi. The storage area floor should be provided with secondary containment such as proper slopes as well as collection pit so as to collect wash water and the leakages/spills etc.
- xvii. All the storage yards should be provided with proper peripheral drainage system connected with the sump so as to collect any accidental spills in roads or within the storage yards as well as accidental flow due to fire fighting.

### **Storage in Drums / Containers**

- i. The container shall be made or lined with the suitable material, which will not react with, or in other words compatible with the hazardous wastes proposed to be stored.
- ii. The stacking of drums in the storage area should be restricted to three meters high on pallets (wooden frames). Necessary precautionary measures should be taken so as to avoid stack collapse. However, for waste having flash point less than 65.5°C, the drums should not be stacked more than one height.
- iii. Stacking of drums may be done on specially rakes designed for holding pallets up to three rows, with height not exceeding 4.5 meters.
- iv. No drums should be opened in the storage sheds for sampling etc. and such activity should be done in designated places outside the storage areas;
- v. Drums containing wastes stored in the storage area should be labeled properly indicating mainly type, quantity, characteristics, source and date of storing etc.

### **Measures for Spillage/leakage control**

- i. The storage areas should be inspected daily for detecting any signs of leaks or deterioration if any. Leaking or deteriorated containers should be removed and ensured that such contents are transferred to a sound container.
- ii. In case of spills / leaks/dry adsorbents/cotton should be used for cleaning instead of water.
- iii. Proper slope with collection pits be provided in the storage area so as to collect the spills/leakages.
- iv. Storage areas should be provided with adequate number of spill kits at suitable locations. The spill kits should be provided with compatible sorbent material in adequate quantity.

### **Record Keeping and Maintenance:**

Proper records with regard to the industry –wise type of waste received, characteristics as well as the location of the wastes that have been stored in the facility need to be maintained.

### **Miscellaneous**

- i) Smoking shall be prohibited in and around the storage areas;
- ii) Good house-keeping need to be maintained around the storage areas.
- iii) Signboards showing precautionary measures to be taken, in case of normal and emergency situations should be displayed at appropriate locations.
- iv) To the extent possible, manual operations with in storage area should be avoided. In case of manual operation, proper precautions need to be taken, particularly during loading / unloading of liquid hazardous waste in drums.
- v) A system for inspection of storage area to check the conditions of the containers, spillages, leakages etc. should be established and proper records should be maintained.
- vi) The wastes containing volatile solvents or other low vapor pressure chemicals should be adequately protected from direct exposure to sunlight and adequate ventilation should be provided.
- vii) Tanks for storage of liquids waste should be properly dyked and should be provided with adequate transfer systems.
- viii) Storage sites should have adequate & prompt emergency response equipment systems for the hazardous waste stored on-site. This should include fire fighting arrangement based on the risk assessment, spill management, evacuation and first aid. For this purpose, on-site and off-site accident/emergency plan should be in place.
- ix) Immediately on receipt of the hazardous waste, it should be analyzed and depending upon its characteristics its storage should be finalized.
- x) Only persons authorized to enter and trained in hazardous waste handling procedures should have access to the storage site.
- xi) Mock drill for onsite emergency should be conducted regularly and records maintained.

### **Storage Time**

Normal storage of incinerable hazardous wastes at TSDFs / Cement Plants / Standalone Pre-processing facilities should be restricted to maximum of 3 months. However State Pollution Control Board/Pollution Control Committee may extend the period upto 6 months in accordance with the Hazardous and other wastes (M & TM) Rules, 2016.

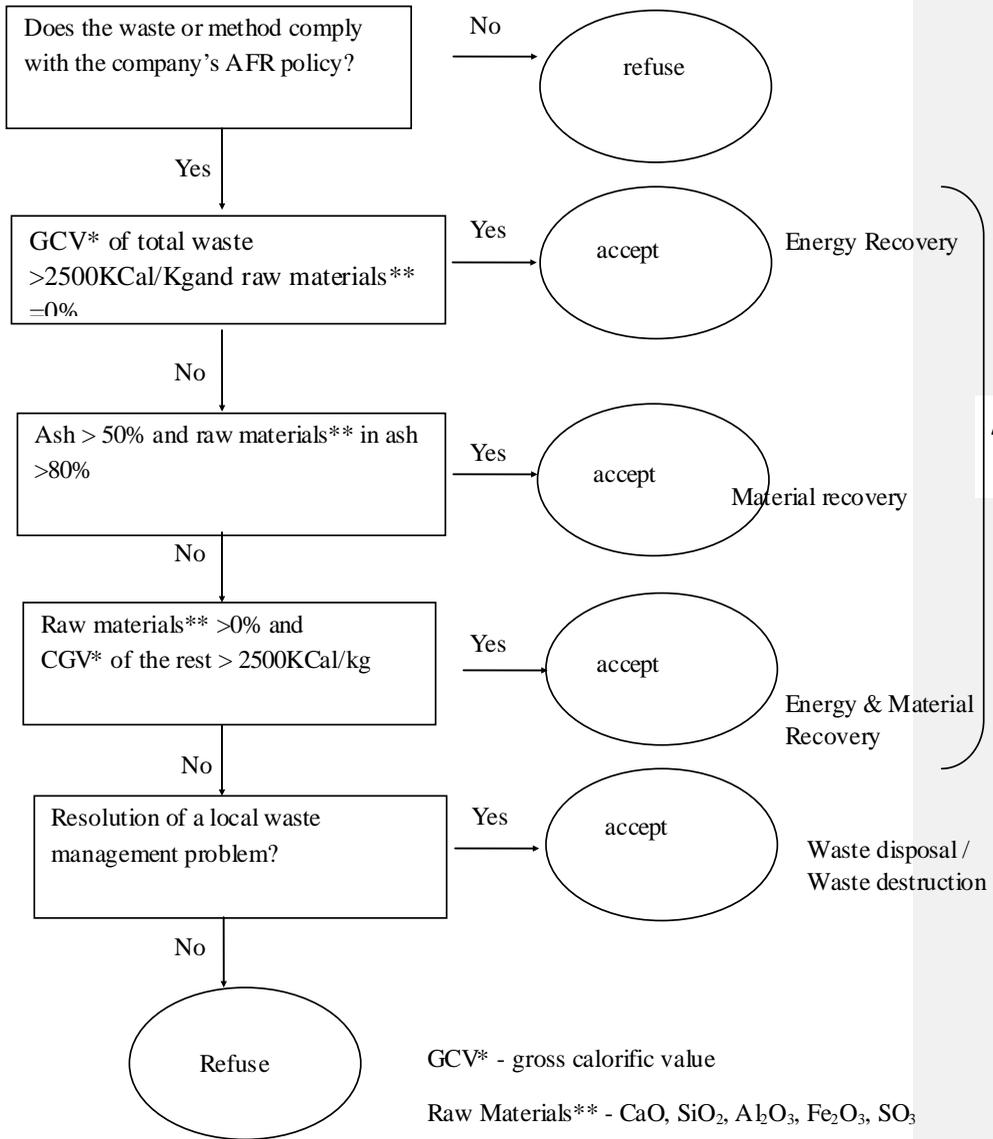
## **Hazard Analysis and Safety Audit:**

For every pre-processing and co-processing facility, a preliminary hazard analysis should be conducted. Safety Audit internally by the Operator every year & externally once in two years by a reputed expert agency should be carried out and same should be submitted to the SPCB/PCC. The code of practice and reporting shall comply to IS 14489.

Such conditions should be stipulated by SPCBs while granting authorization under the HW (M & TBM) Rules to the operators / pre-processing / co-processing facility.

\*\*\*

### Acceptance / Refuse chart



**THE 'LETTER OF INTIMATION' TO SPCBs FOR UNDERTAKING CO-PROCESSING / PRE-PROCESSING OF WASTES**

**(to be applied when new wastes are introduced for co-processing, which were not entioned in while seeking authorization)**

Date : \_\_ \_\_ 20\_\_

To,

State Pollution Control Board / Pollution Control Committee

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

Subject : Letter of intimation for undertaking pre-processing / co-processing of \_\_\_\_\_ from \_\_\_\_\_ in our pre-processing / co-processing facility

This is to inform you that we have finalized arrangement with \_\_\_\_\_ (Name of the industry / municipality / pre-processing agency) to undertake pre-processing / co-processing of following hazardous / non-hazardous waste being generated by them for pre-processing / co-processing in our facility.

- 1.
- 2.
- 3.
- 4.

We agree to maintain appropriate date wise & waste wise records of receipt, pre-processing, co-processing and stock of these wastes and agree to submit the same for scrutiny on demand.

Further, as mandated by the rules, we agree to file returns to you towards the co-processing of all the Hazardous Wastes carried out in our facility on an yearly basis.

Yours faithfully,

(Authorised Signatory)

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**UNDERTAKING**

We,

Lessor  
**MASTER CONCRETECH PVT. LTD.**  
Plot No. 201 to 204 GIDC Palej, District: Bharuch, Gujarat.

And

Lessee  
**M/S. ECO WASTE MANAGEMENT**  
S F. 202, Trade Square, Opp. Sabarmati Power House, Sabarmati,  
Ahmedabad, Gujarat, 380005.

Do hereby undertake as under:

We herewith give undertaking that we Lessor and Lessee both assure you that if any environment damages will happen in the future in unit M/S. ECO WASTE MANAGEMENT then we both will take joint liability for remediation and compensation.

What is stated herein above is true to the best of our knowledge and the same we believed to be true.

Date: 04/12/2021  
Place: Ahmedabad

SERIAL NO. 3761/2021

**B. G. PATEL**  
NOTARY  
GOVT. OF INDIA  
- 4 DEC 2021

For,  
M/s. (Lessor)  
**MASTER CONCRETECH PVT. LTD.**

And  
M/s. (Lessee)  
**M/S. ECO WASTE MANAGEMENT**

(Director)  
**MR. MOHAMMED HANIF KADRI**

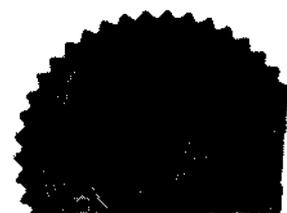
(Partner)  
**Mr. Vangata Vijay Bhaskar Reddy**



BEFORE ME  
**B. G. PATEL**  
NOTARY  
GOVT. OF INDIA

- 4 DEC 2021

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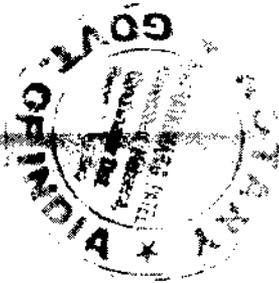
फोटो नहीक डडी  
 Mohammed Hanif Kadri  
 जन्म तारीख/DOB: 18/05/1972  
 लिंग/ MALE  
 Mobile No: 9920370417

9880 6509 3555  
 VIO 9111 6600 8225 3267

माझे आधार, माझी ओळख



hanif



भारत सरकार  
 प्रधानमन्त्री कार्यालय

डा. मोहम्मद शरीफ कद्री, सी 302 सोमा अपार्टमेंट,  
 बुद्धी गैरी, नरमेश्वर, मुंबई - 400061

Address :  
 S/O Mohammed Hanif Kadri, B 302 Soma  
 Apartment, Budhe Gari, Near Shetwad,  
 Andheri West, Mumbai, Mumbai,  
 Maharashtra - 400061

Download Date: 18/04/2015

1446 302 1647

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భారత ప్రభుత్వం  
GOVERNMENT OF INDIA



Vangala Vijay Bhaskar Reddy  
Vangala Vijay Bhaskar Reddy  
Age: 60/08/31/07/1972  
Gender: MALE

5194 7508 3254  
VID: 9104 7990 3308 1072

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భారత ప్రభుత్వం  
GOVERNMENT OF INDIA

ఆధార్ కార్డు  
S/O Vangala Ramana Reddy, Plot No 2,  
Sriways Vihar, Near Prathima Hospital,  
Kukatpally, Hyderabad.  
Telangana - 500077

Address:  
S/O Vangala Ramana Reddy, Plot No 2,  
Sriways Vihar, Near Prathima Hospital,  
Kukatpally, Hyderabad,  
Telangana - 500077

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GROUP  
MASTER CONCRETECH PVT. LTD.

**CERTIFIED TRUE COPY OF THE RESOLUTION PASSED AT THE MEETING OF THE BOARD OF DIRECTORS OF MASTER CONCRETECH PRIVATE LTD HELD AT THE REGISTERED OFFICE OF THE COMPANY ON 03.12.2021 AT 12.00 AM AT THE REGISTERED OFFICE OF THE COMPANY**

**"RESOLVED THAT** the Company entering into Leave & license Agreement with M/s. Eco Waste Management having their address Plot no.76 & 77, Sabar Industrial Park Pvt. Ltd., Village -Asaf, Taluka - Bhiloda, Dist- Aravalli,Gujarat State.

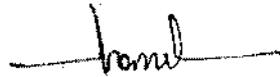
**"RESOLVED FURTHER THAT** Mr.Hanif Kadri, Director of the Company be and is hereby authorized to negotiate, finalize and execute the Leave & license Agreement, filing of tenders with the Government, Semi Government and various Authorities and issue Power of Attorney and documents on behalf of the Company and do all such acts, matters, deeds and things and to take all steps and give such directions as may be required, necessary, expedient or desirable for the aforesaid to the said Deed of Assignment Agreement including authorizing any person by way of execution of Power of Attorney to file the Application, make appearances, and to represent the company before the appropriate authorities and to sign and execute other necessary documents, deeds and other forms on behalf of the Company for the said purpose."

**"RESOLVED FURTHER THAT** the Common Seal of the Company, if required, be affixed as may be required in the presence of any one of the Director of the Company."

**"RESOLVED FURTHER THAT** a certified copy of the resolution be given to any one concerned or interested in the matter."

FOR MASTER CONCRETECH PRIVATE LIMITED

  
DIRECTOR





Records Dept. Mansinhra Smrut, Chhapra Road, Gopohar, Virar (W), Dist. Palghar 401 303 Email: [masterconcretech@gmail.com](mailto:masterconcretech@gmail.com) / [hanifkadri79@gmail.com](mailto:hanifkadri79@gmail.com)



## GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,  
GANDHINAGAR - 382010,  
(T) 079-23232152



By RPAD

In exercise of the power conferred under section-25 of the Water (Prevention and Control of Pollution) Act-1974, under section-21 of the Air (Prevention and Control of Pollution)-1981 and Authorization under rule 5(4) of the Hazardous Waste (Management, Handling and Transboundary Movement) Rules-2016 & as amended from time to time framed under the Environment (Protection) Act-1986.

And whereas Board has received consolidated consent application **Inward No: 274384** dated: **10/03/2023** for the Consolidated Consent and Authorization (CC&A) of this Board and under the provisions/rules of the aforesaid acts. Consents & Authorization are hereby granted as under:

**CONSENTS AND AUTHORISATION:**

(Under the provisions /rules of the aforesaid environmental acts)

To,

**M/s. Eco Waste Management (ID-86796),**  
Plot No: 201 to 204, GIDC Palej,  
Village: Palej, Dist: Bharuch-392220

Sr. No	Type of Facility	Total Capacity
1.	Waste mix preprocessing facility for following waste to prepare fuel for co-processing: a) Waste Mix Solid b) Waste Mix liquid	a) 7500 MT/Month b) 15000 MT/Month

**The Consent Order no. AWH-127517 shall be valid up to date: 31/12/2027.**

**1. SPECIFIC CONDITIONS:**

- 1.1 Unit shall comply all conditions of "Pre-processing and Co-processing of Hazardous and other wastes in Cement plants as per Hazardous and other wastes, Rules 2016 published by CPCB.
- 1.2 Unit shall provide adequate laboratory facility for waste characterization and analysis.
- 1.3 Unit shall provide continuous emission monitoring system for VOC, HF, Cl<sub>2</sub>, Butylene, and H<sub>2</sub>S in storage and process area.
- 1.4 Unit shall provide automatic spark arrestor in process area and LEL detector handy equipment in hazardous waste storage & handling area.
- 1.5 Unit shall take adequate measures to control odour nuisance from the industrial activities which may include measures like- use of masking agent with atomizer system (water curtain), closed/automatic material handling system, containment of the odour vulnerable areas, adequate fogger and mist control system etc. for odor control management.
- 1.6 Unit shall prepare and submit internal SoP for material handling & Pre-processing to the Board.
- 1.7 Unit shall submit copy of MoU with cement industry for adequate quantity for hazardous waste pre processing.
- 1.8 Unit shall send their pre-processed waste as per the waste blend characteristic approved by CPCB to cement industries only.

- 1.9 Unit shall not receive any incompatible waste for co-processing in any case. In no case waste shall be stored in a haphazard manner.
- 1.10 Unit shall not receive hazardous waste requiring prior permission under rule 09 of Hazardous and other waste management Rules 2016 and amended time to time till permission for the same is obtained.
- 1.11 Unit shall provide adequate storage tanks as per CPCB guidelines of storage of hazardous waste.
- 1.12 Unit shall carry out transportation of hazardous wastes through AIS 140 compliant GPS mounted vehicles through VLTS only and adopt and regularly use the online manifest system for procurement & disposal of Hazardous waste.
- 1.13 Unit shall comply with the CPCB guidelines for transportation of hazardous waste.
- 1.14 Applicant shall operate the processing facility in such a way so that stored volume of Hazardous waste/prepared fuel shall not exceed the storage time of 90 days from date of receipt and in case of exceeding the time limit, applicant shall stop immediately receiving hazardous waste from member units until prepared fuel from such stored hazardous waste is sent to cement industries for co processing.
- 1.15 Unit shall comply with CPCB guideline "Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous waste and Penalty". In case of accident/ incident any issue related to groundwater contamination or any other environmental damages, there shall be responsibility of the facility for conducting assessment study and remediation as per CPCB guidelines.
- 1.16 Unit shall provide green belt as per CPCB guideline.
- 1.17 Unit shall provide Wall to Wall carpeting in vehicle movement areas within premises to avoid dusting.
- 1.18 Unit shall strictly carry out handling, storage and disposal of fly-ash, slag, red-mud, deinking sludge etc. (High Volume- Low Effect Wastes) as per prevailing guidelines and its disposal at designated locations approved by the Board.
- 1.19 Unit shall maintain and submit monthly inventory of hazardous & non-hazardous waste i.e. Quantity, type of waste etc utilized for preparation of co-processing blend.
- 1.20 Unit shall submit hazardous waste annual return regularly.

## **2. CONDITIONS UNDER WATER ACT 1974:-**

- 2.1 The quantity of total water consumption is 10.5 KL/Day.
  - a) Domestic: 9.5 KL/Day
  - b) Industrial: 1 KL/Day
- 2.2 The waste water generated from washing & scrubbing shall not exceed 1.0 KLPD. Generated industrial waste water shall be treated in effluent treatment plant and treated waste water shall be used in liquid waste processing.
- 2.3 Unit shall maintain proper records of decontamination of drums and generated waste water shall be used in liquid waste processing in case of decontamination of drums within premises.
- 2.4 The quantity of the domestic waste water (sewage) generation shall not exceed 8.65 KLPD.
- 2.5 The generated domestic waste water shall be disposed through septic tank/soak pit system.

NAZUQ



# 123 GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,  
GANDHINAGAR - 382010,  
(T) 079-23232152

### 3. CONDITIONS UNDER AIR ACT 1981:

3.1 The following shall be used as fuel.

Sr. No.	Fuel	Quantity
1	HSD	15 Lit/Hr

3.2 The applicant shall install & operate air pollution control system in order to achieve norms prescribed here with.

3.3 The flue gas emission through stack attached to the below shall conform to the following standards:

Sr.No	Stack Attached to	Stack height in Meter	APCM	Permissible Limit
1	D.G Set (200 KVA )	As per condition no. 3.5	Acoustic Enclosure	PM : 150 mg/Nm <sup>3</sup> SO <sub>2</sub> : 100 ppm NO <sub>x</sub> : 50 ppm

3.4 The applicant shall provide portholes, ladder, platform etc at chimney(s) for monitoring the air emissions and the same shall be open for inspection to/and for use of Board's staff. The chimney(s) vents attached to various sources of emission shall be designed by numbers such as S-1, S-2, etc. and these shall be painted/displayed to facilitate identification.

3.5 The industry shall take adequate measures for control of noise levels from its own sources within the premises so as to maintain ambient air quality standards in respect of noise to less than 75dB(a) during day time and 70 dB (A) during night time. Daytime is reckoned in between 6a.m. and 10 p.m. and night time is reckoned between 10 p.m. and 6 a.m.

#### D.G Sets Conditions

- The D.G. Set shall have acoustic enclosure and shall comply with the standards specified at Sr. No. 95 of Schedule-I of the rule-3 of E.P. Rules-1986 and Noise pollution level as per the Air Act-1981.

#### D.G. Sets standards:-

The flue gas emission through stack attached to D.G. Sets shall conform to the following standards.

- a) The minimum height of stack to be provided with each of the generator set shall be  $H=h + 0.2 (KVA)^{1/2}$ , where H= Total stack height in meter, h= height of the building in meters where or by the side of which the generator set is installed.
- b) Noise from DG set shall be controlled by providing an acoustic enclosure or by treating the room acoustically, at the users end.
- c) The acoustic enclosure or acoustic treatment of the room shall be designed for minimum 25 dB (A) insertion loss or for meeting the ambient noise standards, whichever is on the higher side ( if the actual ambient noise is on the higher side, it may not be possible to check the performance of the acoustic enclosure/ acoustic treatment. Under such circumstances the performance may be checked for noise reduction up to actual ambient noise level, preferably, in the night time). The measurement for insertion loss may be done at different points at 0.5 m from the acoustic enclosure/room, and the averaged.

*M. S. V. S.*

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- d) The D.G. Set shall be provided with proper exhaust muffler with insertion loss of minimum 25 dB (A).
- e) All efforts shall be made to bring down the noise level due to the D.G. Set, outside the premises, within the ambient noise requirements by proper siting and control measures.
- f) Installation of a D.G. Sets must be strictly in compliance with the recommendations of the D.G. Set manufacturer.
- g) A proper routine and preventive maintenance procedure for the D.G. Set should be set and followed in consultation with the DG Set manufacture which would help prevent noise levels of the DG Set from deteriorating with use.

3.6 The process gas emission through stack attached to process area stack shall conform to the following standards :

Sr No.	Stack attached to	Stack height in meter	APCM	Permissible limit
1.	Blender/Mixer/stirrer vessels-1 (2 nos.) (For liquid waste mix)	20 meter	Suction Hood with activated carbon column followed by wet scrubber	PM : 150 mg/Nm <sup>3</sup> SO <sub>2</sub> : 100 ppm NO <sub>x</sub> : 50 ppm
2.	Blender/Mixer/stirrer vessels-2 (2 nos.) (For solid waste mix)			
3.	Crusher/Shredders (2 Nos.) (For solid waste)			
4.	Fumes Extraction System (For Odour Control)	20 meter	Suction Hood with activated carbon column followed by wet scrubber	PM : 150 mg/Nm <sup>3</sup> SO <sub>2</sub> : 100 ppm NO <sub>x</sub> : 50 ppm
5.	Blending/ Mixing/ Stirring area (for solid waste mix)			

- 3.7 Unit shall provide odour control system and fume extraction system in process area.
- 3.8 The applicant shall take all necessary measures so as to minimize the fugitive emission
- 3.9 Ambient air quality within the premises of the industry shall conform to the following standards: -

PARAMETER	Concentration in Ambient Air		Method of Measurement
	Annual	24 hrs. Average	
Particulate matter-10 (PM 10)	60 µg/m <sup>3</sup>	100 µg/m <sup>3</sup>	Gravimetric, TOEM Beta attenuation
Particulate matter-2.5 (PM 2.5)	40 µg/m <sup>3</sup>	60 µg/m <sup>3</sup>	Gravimetric, TOEM Beta attenuation
SO <sub>2</sub>	50 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	Improved West and Gacke Ultraviolet fluorescense
NO <sub>x</sub>	40 µg/m <sup>3</sup>	80 µg/m <sup>3</sup>	Modified Jacob & Hoecheiser (Na-Arsenite) Chemiluminescence

*Handwritten signature*



# 125 GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,  
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Benzene	5 µg/m <sup>3</sup>	-----	Gas chromatography based continuous analyzer Adsorption and Desorption followed by GC analysis
Benzo (a) pyrene (BaP) -Particulate Phase only	01 ng/m <sup>3</sup>	-----	Solvent extraction followed by HPLC/GC analysis
Arsenic(As)	06 ng/m <sup>3</sup>	-----	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
Nickel (Ni)	20 ng/m <sup>3</sup>	-----	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper
Lead (Pb)	0.50µg/m <sup>3</sup>	1.0 µg/m <sup>3</sup>	AAS/ICP method after sampling on EPM 2000 or equivalent filter paper ED-XRF using Teflon filter
Ammonia	100 µg/m <sup>3</sup>	400µg/m <sup>3</sup>	Chemiluminescence Indophenol blue method
Ozone	100 µg/m <sup>3</sup> 8 hours	180 µg/m <sup>3</sup> 1 hour	UV photometric Chemiluminescence Chemical Method
Carbon Monoxide (CO)	02 mg/m <sup>3</sup> 8 hours	04 mg/m <sup>3</sup> 1 hour	Non dispersive Infra Red (NDIR) spectroscopy

#### 4. AUTHORISATION FOR THE MANAGEMENT & TRANSBOUNDARY MOVEMENT OF HAZARDOUS AND OTHER WASTES

4.1 Number of authorization: AWH-127517 Date of issue: 10/03/2023. M/s. Eco Waste Management is hereby granted an authorization to operate facility for following hazardous waste on the premises situated at Plot No: 201 to 204, GIDC Palej, Village: Palej, Dist: Bharuch-392220.

4.2 Granted to operate a facility for collection, storage, transportation and ultimate disposal of Hazardous wastes as above.

Sr No	Type of Waste	Sch-Category	Quantity in Year	Mode of Disposal
1	Hazardous & Non-Hazardous waste	--	2,70,000 MT	Reception, Collection, treatment, Storage & its use for preparation of waste mixed liquid/solid and disposal at cement industry for co-processing by use of GPS enable vehicle and Xgn generated online manifest.
2	Used Oil	I-5.1	1 MT	Collection, storage & Transportation, sale to authorize register recycler or used as lubricant machinery
3	Plastic Drums / barrels/ liners	I-33.1	760 MT	Collection, Generation, Storage & Transportation and sale to

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				authorized register recycler or decontamination facility or send to co-processing in Cement Industries after cutting / shredding
	MS Drums / barrels/ liners		1705 MT	Collection, Generation, Storage & Transportation and sale to authorize register decontamination facility or decontamination within premises.
4	Scrubbing Media (Activated carbon media use in scrubber)	I-36.2	100 MT	Collection, Storage and send to cement Industries with mixing along with raw material (Pre-processing & send to cement industries for co-processing)

- 4.3 The authorization is subject to the conditions stated below and such other conditions as may be specified in the rules from time to time under the Environment (Protection) Act-1986.
- 4.4 The authorization shall be in force for a period of five years (i.e. up to 03/01/2027).
- 4.5 Any unauthorized change in personnel, equipment or working conditions as mentioned in the authorization order by the persons authorized shall constitute a breach of this authorization.
- 4.6 An application for the renewal of an authorization shall be made as laid down in rule 5 (7) (ii).
- 4.7 Industry shall submit annual report within 15 days and sub squinty by 31st January every year.
- 4.8 Industry shall have to manage waste oil; discarded containers etc as per the Rules 2016 and shall apply Authorization/submit details for all the applicable waste as per the Rules 2016 within 15 days.
- 4.9 The person Authorized shall not rent, lend, sell, transfer or otherwise transport the hazardous and other wastes except what is permitted through this authorization.
- 4.10 The person authorized shall implement Emergency Response Procedure (ERP) for which this authorization is being granted considering all site specific possible scenarios such as spillages, leakages, fire etc. and their possible impacts and also carry out mock drill in this regard at regular interval of time;
- 4.11 The person authorized shall comply with the provisions outlined in the Central Pollution Control Board guidelines on "Implementing Liabilities for Environmental Damages due to Handling and Disposal of Hazardous Waste and Penalty"
- 4.12 Any other conditions for compliance as per the Guidelines issued by the Ministry of Environment, Forest and Climate Change or Central Pollution Control Board from time to time.
- 4.13 Annual return shall be filed by June 30th for the period ensuring 31st March of the year.
- 4.14 The authorization is granted to operate a facility for collection, storage, within the factory premises and treatment, transportation and ultimate disposal of Hazardous wastes as above.

##### **5 GENERAL CONDITIONS:**

- 5.1 The applicant shall have to submit the returns in prescribed form regarding water consumption and shall have to make payment of water cess to the Board under the Water Cess Act- 1977.

*Asua*



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PARYAVARAN BHAVAN, SECTOR 10-A,  
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5.2 Applicant shall have to comply with all guidelines/ directives issued / being issued by MOEF / CPCB /DOEF.

5.3 Applicant shall have to comply with Risk Assessment and Disaster management Plan.

5.4 Applicant shall have to carry out mock drill both on site and off site for all the possible eventualities at a regular interval of time. For any of the disastrous situation escape route shall have to be predefined properly marked and shall be brought to the knowledge of all the concerned.

5.5 Applicant shall have to comply with the Environmental Audit Scheme introduced by Hon'ble High Court and shall submit the Environment Audit Report every year in accordance with directions given in the High Court Order dated 16/09/1999 in Environmental Audit Scheme.

5.6 Unit shall enhance CER fund allocation to at least 1.5 times the slabs given in the OM dated 01.05.2018 for SPA and 2 times for CPA in case of Environmental Clearance.

5.7 In case of change of ownership/management the name and address of the new owners/partners/directors/proprietor should immediately be intimated to the Board.

5.8 The concentration of Noise in ambient air within the premises of industrial unit shall not exceed following levels:

Between 6 A.M. and 10 P.M.: 75 dB (A)

Between 10 P.M. and 6 A.M.: 70 dB (A)

5.9 You shall comply with the manufacturing, Storage and Import of Hazardous Chemicals Rules-1989 framed under the Environment (Protection) Act-1986.

5.10 Full support shall be extended to the officers of MoEF, CPCB, GPCB and all other relevant authorities by the project proponents during their inspection for monitoring purposes by furnishing full details and action plans including the action taken reports in respect of initiative measures and other environmental protection activities.

5.11 GPCB reserves the right to stipulate additional condition if found necessary. The company shall implement these conditions in a time bound manner.

For And On Behalf Of GPCB

*(Handwritten Signature)*  
18/7/23

(N. A. Shah)

Unit Head, Hazardous Waste Cell

No. GPCB/ HAZ-GEN-740/ID-86796/

Date:

Issued to:

M/s. Eco Waste Management (ID-86796),

Plot No: 201 to 204, GIDC Palej,

Palej, Dist: Bharuch-392220

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**GUJARAT POLLUTION CONTROL BOARD**

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**BY R.P.A.D.**

**CLOSURE DIRECTION UNDER SECTION-5 OF ENVIRONMENT (PROTECTION) ACT-1986 FOR THE VIOLATIONS OF THE HAZARDOUS & OTHER WASTES (MANAGEMENT & TRANSBOUNDARY MOVEMENT) RULES-2016 AS AMENDED FROM TIME TO TIME.**

**WHEREAS, you M/s. Eco Waste Management** are carrying out industrial activity at plot No. 201 to 204, GIDC Palej, Dist: Bharuch.

**AND WHEREAS, the Board** has granted you Consolidated Consent & Authorization (CCA) under the provisions of Water Act-1974, Air Act-1981 and Hazardous Waste Rule-2016 by its order no. AWH-127517 which is valid up to 31/12/2027 for operation of the industrial plant for hazardous waste pre-processing.

**AND WHEREAS, during the inspection of your industrial plant on dt.08/08/2023** by the officers of the Board, it was noticed that:

1. During visit (Shri Sahjananad Dairy) chemical odour is felt at entrance of the unit as well in back side of the unit.
2. Very strong unbearable pungent smell was felt near mixing of solid and semi-solid waste through JCB area.
3. Unit is not carried out mixing activities (pre-processing) of semi solid and solid on RCC flooring in one corner of the shed without suction facility and APCM. Unit has not provided solid pit for the pre-processing of solid and semi solid hazardous waste.
4. Unit has not provided adequate labeling with waste inventory and also unit has not provided SOP for handling of waste.
5. Unit has not provided pacca road within all premises.
6. Unit has not provided handy LEL detector as per condition no. 1.4 of CC&A.
7. Provided deodorant fogger within shed is not found adequate due to very pungent obnoxious smell of material. In other words, unit has not taken adequate steps for control of odour nuisance from industrial activities as per condition no. 1.5 of CC&A.
8. Unit has not provided internal SOP for material handling & pre-processing of waste as per condition no. 1.6 of CC&A.
9. Mixing is going on at the location other than the area where online sensors for VOC, C<sub>4</sub>H<sub>8</sub>, H<sub>2</sub>S, Chlorine etc. are provided and therefore results were showing Nil.
10. During visit strong chemical smell felt in shed/premises/entrance of premises. It is also observed that this smell persist in cloths/body of visiting officer for more than 12 hours.
11. Unit has found provided laboratory for analysis of hazardous waste however looking to the site it seems that it is not operational. No record /logbook of basic analysis or compatibility analysis pertaining to hazardous waste found in trucks /tankers lying within premises is observed.
12. During visit workers working in the industry and involved in handling of waste found working without PPEs. Unit has not taken adequate care for the safety.
13. There is no inventory of batch wise/truck wise waste receipt is available or maintained.
14. Hazardous waste stored haphazardly in shed.
15. No proper labelling found provided on waste drums. Waste drums are found stored within shed without proper stacking.

16. Complaint from the surrounding area including Palej Industrial Estate Association is received about causing extreme air pollution.
17. Unit has not submitted reply of the written remarks given during visit for the observed various non compliance and corrective measures.

**AND WHEREAS**, Regional Manager, GIDC, Ankleshwar vide letter dt. 18/08/2023 has written letter to Regional Officer, GPCB-Bharuch that Palej industrial estate is an engineering zone and you are utilizing the plots for the chemical purposes and also have asked not to give permission to chemical plants in Palej industrial estate.

**AND WHEREAS**, Chief officer (Notified Area), GIDC-Palej vide letter dt. NTA/PLJ/648 dt. 18/08/2023 has asked President, Palej Industrial Estate to disconnect water supply of Plot No.201 to 204.

**UNDER THE CIRCUMTANCES**, I, D. M. THAKER, Member Secretary of Gujarat Pollution Control Board in exercise of the power conferred on file no. Legal-G-28 under section (5) of the Environment (Protection) Act -1986 to issue directions as under:

1. To prohibit the manufacturing activities of unit with immediate effect.
2. If your production plant runs on captive power plant or on D.G. Set, then you shall stop them also with immediate effect.
3. That the concerned authorities shall stop supply of electricity to your plant with immediate effect till further order issued.
4. Submit Bank Guarantee of Rs. 1,00,000/- (one Lakh only) to the board for compliance assurance at the time of revocation.
5. Interim Environment Damage compensation (EDC) may be decided and communicated by board later on. Unit shall pay interim EDC as and when communicated by board at the time of revocation.

If the above Directions are not complied, you are liable for prosecution under section 15 of the Environment (Protection) Act-1986 which provides punishment with imprisonment for a term which may extend to five years and with fine which may extend to Rs. One Lac or Both.

If you are aggrieved by the aforesaid direction, you may file an appeal under section 5 A of the Environment Protection Act 1986 before National Green Tribunal within thirty days from the date of this order.

For and on behalf of  
Gujarat Pollution Control Board

*D. M. Thaker*  
13/09/2023

(D. M. THAKER)  
MEMBER SECRETARY

No. GPCB/ HAZ/GEN-740/ID-86796/

Date:

**Issued To:**

**M/s. Eco Waste Management**  
Plot No. 201 to 204, GIDC Palej,  
Dist: Bharuch

Outward No. 13/09/2023



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PARYAVARAN BHAVAN, SECTOR 10-A,  
GANDHINAGAR - 382010,  
(T) 079-23232152

**Copy To:**

1. **The Superintendent Engineer (O&M)**  
Circle Office,  
Dakshin Gujarat Vij Co Ltd,  
Maktampur Road, Bharuch
2. **The Executive Engineer (O&M)**  
Circle Office,  
Dakshin Gujarat Vij Co Ltd,  
Maktampur Road, Bharuch
3. **The Deputy Engineer (O&M)**  
Circle Office,  
Dakshin Gujarat Vij Co Ltd,  
Maktampur Road, Bharuch..... Request you to arrange for disconnection of supply of  
ELECTRICITY (except single phase) with immediate effect from the date of issue of this  
order to the industrial plant of M/s. Eco Waste Management located at Plot No.201 to 204,  
GIDC Palej, Dist: Bharuch and arrange to intimate to us accordingly.
4. **The Regional Officer, GPCB, Bharuch** ..... to ensure the compliance of order and  
submit visit report.
5. **The Unit Head, Bharuch**..... for information and necessary action please.

For and on behalf of  
Gujarat Pollution Control Board

*D. M. Thaker*  
13/09/2023  
(D. M. THAKER)  
MEMBER SECRETARY

Outward No: 753170, 13/09/2023

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**GUJARAT POLLUTION CONTROL BOARD**

PARYAVARAN BHAVAN, SECTOR 10-A,

GANDHINAGAR - 382010,

(T) 079-23232152

**By R.P.A.D.****Withdrawal and Cancellation of CTE & CCA**

**WHEREAS**, the Gujarat Pollution Control Board has granted Consolidated Consent and Authorisation (CC&A) under the Water (Prevention and Control of Pollution) Act, 1974, the Air (Prevention and Control of Pollution) Act, 1981 and the Hazardous and other Waste (Management and Handling) Rules, 2016 to M/s. Eco Waste Management vide CTE No. 120569 dated 20/08/2022 and CCA order No. AWH-127517 dated 18/07/2023.

**AND WHEREAS**, the Board is empowered to review the permission granted, from time to time and cancel such consent under the provisions of Section 27(2)(a) of the Water (Prevention and Control of Pollution) Act, 1974, under Section – 21(4) of the Air (Prevention and Control of Pollution) Act 1981 and the Environment (Protection) Act – 1986 and make such order as deemed fit.

**AND WHEREAS**, Authorized officers of Regional Office Bharuch has carried out inspection of your plant on dated 08/08/2023 and based on observation, board has issued closure direction u/s 5 of EP Act 1986 for the violation of HOWM Rules 2016 vide order no. GPCB/HAZ/GEN-740/ID:86796/753171 dated 13/09/2023 for the reasons mentioned therein.

**AND WHEREAS**, you have submitted Revocation application vide your letter dt. Nil received to board on dt. 02/11/2023.

**AND WHEREAS**, Authorized officers of Regional Office Bharuch has carried out inspection of your plant w.r.to revocation application on dated 13/12/2023 and observed that,

- 1) During inspection, @3543.695 MT of waste is observed within premises, which is stored differently in storage tanks, sumps, tanker, drums & @700-800 MT of mixing waste.
- 2) Unit has total 27 nos of tanks among which 18 nos of tanks are found filled with waste (@690 MT), Sumps having capacity of 30 KL each (4 Nos), 2 tankers of 50 KL each, drums @9000 Nos (@1800 MT).
- 3) Chemical odour felt within premises where hazardous waste is found stored in closed shed.
- 4) Unit has proposed to install additionally APCM and fogger system which is not yet installed.
- 5) Unit has not provided pucca road within all premises yet.
- 6) During inspection, no any fogger system is found working.
- 7) No any online sensor observed at mixing area.

- 8) During inspection, strong chemical smell felt in shed of premises and this smell persist in cloth /body also.
- 9) During inspection, no any laboratory incharge was present. No any record/logbook available by person contacted.
- 10) Plant is not found in operation and workers are not wearing any PPEs while showing site.
- 11) Unit has not made available inventory of batch wise/truck wise waste receipt during inspection.
- 12) Unit has stored hazardous waste partially systematic.
- 13) Unit has not submitted reply of the board letter dt.30/11/2023 regarding submission of (a) water supply re-connection letter of palej industrial estate and (b) plot allotment letter of GIDC for the plot utilization for chemical purpose.
- 14) Industry has not submitted reply of the online query raised by RO-Bharuch w.r.to inspection dt.13/12/2023.

**AND WHEREAS**, board has rejected the revocation application vide order no.GPCB/HAZ/GEN-740/ID:86796/810093 dated 01/05/2024 for the reasons mentioned therein and directed to submit following details.

- 1) Submit inventory of the quantity of total hazardous waste stored in plant premises in terms of raw material (hazardous waste received but yet to be pre-processed) and finished product (hazardous waste received and pre-processed and ready for co-processing).
- 2) To dispose/transfer stored raw material (hazardous waste received but yet to be pre-processed) to other pre-processing facility having valid permission using VLTS system and online manifest system in time bound manner under the intimation of GPCB.
- 3) To dispose/transfer finished product hazardous waste received and pre-processed and ready for co-processing) to any cement industries using VLTS system and online manifest system in time bound manner under the intimation of GPCB.
- 4) To take all the necessary safety precautions to avoid any possible fire hazard.

**AND WHEREAS**, board has issued Notice of Intension for revocation of CTE and CC&A granted to the industry vide letter no. GPCB/HAZ/GEN-740/ID:86796/809993 dated 30/04/2024 for the reasons mentioned therein and provided with a 15 days time to reply.



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PARYAVARAN BHAVAN, SECTOR 10-A,  
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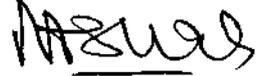
**AND WHEREAS**, board has not received any reply from you w.r.to to Notice of intension for revocation of CTE and CCA, rejection of closure revocation order dt. 01/05/2024, inspection remarks given by Regional Office – Bharuch during various inspections.

**AND THEREFORE**, based on the powers conferred on the Board under the provisions of Section 27(2)(a) of the Water (Prevention and Control of Pollution) Act, 1974, under Section – 21(4) of the Air (Prevention and Control of Pollution) Act 1981 and the Environment (Protection) Act – 1986, the Board has decided to withdraw and cancel the CTE No. 120569 dated 20/08/2022 and CCA order No. AWH-127517 dated 18/07/2023 granted to your Industrial Plant under the Water (Prevention and Control of Pollution) Act, 1974, Air (Prevention and Control of Pollution) Act 1981 and the Environment (Protection) Act – 1986.

**AND ACCORDINGLY** The CTE No. 120569 dated 20/08/2022 and CCA order No. AWH-127517 dated 18/07/2023 is herewith withdrawn and cancelled with immediate effect and M/s. Eco Waste Management located at Plot no. 201 to 204, GIDC Palej, Dist: Bharuch. All necessary safety precautions is required to be taken.

This order is issued after approval of competent authority.

For and on behalf of  
Gujarat Pollution Control Board,

  
31/6/24  
(N. A. Shah)

Unit Head, Hazardous waste cell

No: GPCB/HAZ/GEN-740/ID: 86796/

Date:

Issued to:

M/s. Eco Waste Management,  
Plot no. 201 to 204, GIDC Palej,  
Dist: Bharuch

Outward No: 812805, 03/06/2024

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**GUJARAT POLLUTION CONTROL BOARD**

PARYAVARAN BHAVAN, SECTOR 10-A,  
GANDHINAGAR - 382010,  
(T) 079-23232152

R.P.A.D.

**DIRECTION UNDER SECTION-5 OF ENVIRONMENT (PROTECTION) ACT-1986 FOR THE VIOLATIONS OF THE HAZARDOUS & OTHER WASTES (MANAGEMENT & TRANSBOUNDARY MOVEMENT) RULES-2016 AS AMENDED FROM TIME TO TIME**

**WHEREAS**, you **M/s. Eco Waste Management** are carrying out industrial activity at plot no. 201 to 204, GIDC Palej, Dist: Bharuch.

**AND WHEREAS**, you are the lessor of this premises where M/S Eco Waste Management are carrying out industrial activity.

**AND WHEREAS**, you Lessor with Lessee have submitted notarized undertaking dt. 04/12/2021 wherein it is undertaken that we lessor and lessee both assure you that if any environment damages will happen in the future in unit M/s Eco Waste Management then we both will take joint liability for remediation and compensation.

**AND WHEREAS**, the Board has issued Closure Direction u/s 5 of Environment Protection Act 1986 for the violations of the Hazardous & Other Wastes (Management & Transboundary Movement) Rules 2016 as amended from time to time vide order No.GPCB/HAZ/GEN-740(1)/ID:86796/753170 dated 13/09/2023 for the reasons mentioned therein.

**AND WHEREAS**, the Board has withdrawn and cancelled the earlier granted CTE vide order No. 120569 dated 20/08/2022 and CCA vide order No. AWH-127517 dated 18/07/2023 under the provisions of Water Act-1974, Air Act-1981 and Hazardous Waste Rule-2016 for establishment and operation of the industrial plant vide this office order bearing no. GPCB/HAZ/GEN-740(1)/ID:86796/ 812805 dated 03/06/2024 for the reasons mentioned therein.

**AND WHEREAS**, there is an urgent need to transfer/dispose the hazardous waste in environmentally sound manner.

**AND WHEREAS**, as lessor of the facility residual liability lies with you and you are equally responsible.

**AND WHEREAS**, during visit carried out by officials of GPCB Regional Office Bharuch on dated 13/12/2023, it was observed that industry has failed to comply the closure direction dated 13/09/2023 and board has also rejected the industry's closure revocation application and directed for following points vide letter no. GPCB/HAZ/GEN-740(1)/ID:86796/810093 dated 01/05/2024.

1. Submit inventory of the quantity of total hazardous waste stored in plant premises in terms of raw material (hazardous waste received but yet to be pre-processed) and finished product (hazardous waste received and pre-processed and ready for co-processing).
2. To disposed/transfer stored raw material (hazardous waste received but yet to be pre-processed) to other pre-processing facility having valid permission using VLTS system and online manifest system in time bound manner under the intimation of GPCB.
3. To dispose/transfer finished product (hazardous waste received and pre-processed and ready for co-processing) to any cement industries using VLTS system and online manifest system in time bound manner under the intimation of GPCB.
4. To take all the necessary safety precautions to avoid any possible fire hazard.

**AND WHEREAS,** in spite of various letter, direction, communication; industry has not complied and also not submitted plan for compliance.

**UNDER THE CIRCUMTANCES, I, D. M. THAKER, Member Secretary of Gujarat Pollution Control Board in exercise of the power conferred on file no. Legal-G-28 under section (5) of the Environment (Protection) Act -1986** issue direction as under:

1. Carry our factual inventory of the quantity of total hazardous waste stored in plant premises in terms of raw material (hazardous waste received but yet to be pre-processed) and finished product (hazardous waste received and pre-processed and ready for co-processing).
2. **To immediately dispose off entire such hazardous waste material lying within plant premises in environmentally sound manner at authorized facility in co-ordination with Regional Officer-Bharuch using VLTS system & online manifest system and under supervision of expert(s) within 15 days and to submit action taken report. Characterisation/analysis of the material disposed off shall be carried out and records thereof shall be maintained.**
3. To take all the necessary safety precautions to avoid any possible fire hazard and environment damages.

If the above Directions are not complied, you are liable for prosecution under section 15 of the Environment (Protection) Act-1986 which provides punishment with imprisonment for a term which may extend to five years and with fine which may extend to Rs. One Lac or Both.

Outward No: 81282-3/06/2014



# 136 GUJARAT POLLUTION CONTROL BOARD

PARYAVARAN BHAVAN, SECTOR 10-A,  
GANDHINAGAR - 382010,  
(T) 079-23232152

If you are aggrieved by the aforesaid direction, you may file an appeal under section 5 A of the Environment Protection Act 1986 before National Green Tribunal within thirty days from the date of this order.

For and on behalf of  
Gujarat Pollution Control Board

*D.M. Thaker*  
*3/6/2024*

(D. M. Thaker)  
Member Secretary

No. GPCB/HAZ/GEN-740(1)/ID:86796/

Date:

Issued To:

1. **Shri Mahammed Hanif Kadri (Lessor)**  
B-302, Sonia Apartment, Buddha Gally,  
Near Bhatwadi, Andheri West,  
Mumbai – 400061.

2. **M/s. Eco waste management**  
Plot no. 201 to 204, GIDC Palej, Dist: Bharuch.

Outward No:812822,03/06/2024

Clean Gujarat Green Gujarat

## FIRST INFORMATION REPORT

પ્રથમ માહિતી અહેવાલ

(Under Section 173 B.N.S.S)

(ભારતીય નાગરિક સુરક્ષા સંહિતાની કલમ 173 હેઠળ)

- 1 District ભરુચ Police પાલેજ Year 2024 FIR N 11199039240 Date 16/10/2024  
(જિલ્લો) (પોલીસ સ્ટેશન) (વર્ષ) (પ્ર.મા. અ.ક્રમાંક) (તારીખ)
- 2 (i) Act બી.એન.એસ (અધિનિયમ) Section 125,287,270,280,54 ns (કલમો)  
(ii) Act પર્યાવરણ સુરક્ષા અધિનિયમ (અધિનિયમ) Section 8,15(1) ns (કલમો)
- 3 (a) Occurrence of offence: (ક) (ગુનો બન્યાનો સમયગાળો)  
Day. મંગળવાર Date from 18/06/2024 Date to 16/10/2024  
(દિવસ) (તારીખથી) (તારીખ સુધી)  
Time Period સમયગાળો Time from 00:00 Time to 15:15  
(કલાકથી) (કલાક સુધી)  
(b) Information received Date 16/10/2024 Time 15.45  
(ખ) at PS: (પોલીસ મથકે માહિતી મળ્યા) (તારીખ) (સમય)  
(c) General Diary Reference: Entry No. (સ્ટેશન ડાયરી સંદર્ભ: એન્ટ્રી નં) Time (સમય)
- 4 Type of Information: (માહિતીનો પ્રકાર) મૌખિક
- 5 Place of Occurrence: (ઘટનાનું સ્થળ)  
(a) Direction and distance from પૂર્વ 2.00 (કિ.મી.) Beat No. (ક) P.S. (પોલીસ સ્ટેશનથી દિશા અંતર) (બીટ નંબર)  
(b) Address જી. આઈ. ડી. સી.માં આવેલ ઈકો વેસ્ટ મેનેજમેન્ટ કંપનીમાં આવતા, (ખ) s ગામ, પાલેજ, (સરનામું) તા. ભરુચ, જી. ભરુચ.  
(c) In case, outside the limit of this Police Station, then (ગ) (પોલીસ સ્ટેશનની લઠની બહાર હોય તો તે પોલીસ સ્ટેશનનું નામ)  
Name of P.S. District (પોલીસ સ્ટેશનનું નામ) (જિલ્લો)  
(મ)

## 6 Complainant/Informant:

(ફરિયાદી / જાતનીદાર)

(a) Name (ક) નામ	કિશોર નાજભાઈ ઈ વાઘમશી જા ને આલીર	(b) (ખ)	Father's/ Husband' s Name (પિતા/પતિનું નામ)	નાજભાઈ વાઘમ શી જાને આલીર
(c) Date/Year of Birth (ગ) ર્થ (જન્મ તારીખ / વર્ષ)	54	(d) (ઘ)	Nationality (રાષ્ટ્રીયતા)	ભારતીય
(e) (ઙ)		(f) Occupation (ચ) (ધંધો)	Address (સરનામું)	જી.આઈ.ડી.સી નર્મ દાનગર , ગામ. ભરૂચ, તા. ભરૂચ, જી. ભરૂચ, મૂળ રહે. મુ.લાલપુર , તા.વિસાવદર, જી. જૂનાગઢ .

## 7 Details of known/suspected/unknown accused with full particulars:

(Attach separate sheet, if necessary)

(ઓળખાયેલ/શકમંદ/વખુઓળખાયેલ આરોપીની તમામ વિગતો સાથેની માહિતી)

(જરૂર જણાયતો અલાયદા કાગળ ઉપર વિગત દર્શાવવી)

Accused Name  
(તહોમતદારનું નામ)Age(Ap  
prox.) Address  
(સરનામું)  
(ઉંમર) (  
આશરે)

(1) વાંગલા વિજય ભાસ્કર રેડ્ડી

10,

બીજો માળ અનિયા એનકલેવ સાઉથર્ન સ્પાઈ  
સ રેસ્ટોરેન્ટની પાછળ રોડ ,  
જી. હેદરાબાદ,  
જુબ્લી હિલ્સ,  
500033.

(2) ષ્કોટ શેડના માલિક મહમદ હનીફ કાદરી

બી-૩૦૨,

સોનિયા એપાર્ટમેન્ટ બુધ્ધાગલી ,  
અંધેરી વેસ્ટ મુંબઈ,  
જી. મુંબઈ સિટી,  
ભાટવાડી નજીક,  
400061.

(3) અન્ય જવાબદાર ઈસમો

## 8 Reasons for delay in reporting by the complainant/Informant

(ફરિયાદી/જાતનીદાર તરફથી ગુનાની જાણ કરવામાં વિલંબ થવાના કારણો)

## 9 Particulars of properties stolen(Attach separate sheet, if necessary)

(ચોરાયેલી/ગુનામાં સંડોવાયેલ ચીજ વસ્તુઓની વિગતો) (જરૂર જણાયતો અલાયદા કાગળ ઉપર વિગત દર્શાવવી).

## 10 Total value of property stolen

(ચોરાયેલી / ગુનામાં સંડોવાયેલ ચીજ વસ્તુઓની કુલ કિંમત)

- )
- 11 Inquest Report/U.D. case No. if any  
(મુત્યુ વિષયક તપાસ અહેવાલ / અકુદરતી મોતનો નંબર લો  
ય તો ને)
- 12 First Information contents(Attach seperate sheet, if required)  
(પ્રથમ માહિતી અહેવાલની વિગતો)(જરૂર જણાયતો અલગદો કાગળ જોડવો)

ગુનો તે એવી રીતે કે આ કામના આરોપીઓએ મોજે પાલેજ જી. આઈ. ડી.સી. માં આવેલ ઈકો વેસ્ટ મેનેજમેન્ટ કંપનીમાં વિપુલ માત્રામાં જોખમી કચરો બિન વારસી હાલતમાં મૂકીને તેમજ સ્થળ ઉપર કોઈ જરૂરી વૈજ્ઞાનિક અભ્યાસ કચરોને રેમેડીએશનની કામગીરી માટેની કાર્યવાહી ન કરી પર્યાવરણને નુકશાન થાય તેમજ માનવ પશુ, પક્ષી શીતના જીવનની સલામતી જોખમાય તેમજ આજુબાજુમાં આવેલ બીજી અન્ય નાના મોટી ફેક્ટરીઓને નુકશાન થાય ને આ જોખમી કચરોથી ભવિષ્યમાં આગ લાગવાની શક્યતાથી આજુબાજુમાં તેમજ પર્યાવરણ તેમજ માનવ વસ્તીને જોખમ થાય તેવું જાણતા હોવા છતાં બેદરકારીભર્યું ગંભીર કૃત્ય આચરી એકબીજાની મદદગારી કરી ગુનો કર્યો તે વિગેરે બાબત.

Complaint(ફરિયાદ)

તા.૧૬/૧૦/૨૦૨૪

મારું નામ કિશોર નાજભાઈ વાઘમશી જાતે.આહીર ઉ.વ.૧૪ ધંધો નોકરી મૂળ રહે. મુ.લાલપુર, તા. વિસાવદર, જી.જૂનાગઢ હાલનું સરનામું - પ્લોટ નંબર-સી-૧/૧/૧૧૯/૩, જી.આઈ.ડી.સી નર્મદાનગર જી.ભરૂચ મો.૯૦ ૧૬૧-૪૧૫૧૧૫

રૂબરૂમાં આવી જાહેર કરી મારી ફરિયાદ હકીકત લખાયું છે કે, હું ઉપર ખતાવેલ સરનામે રહું છું અને સને-૨૦૨૩ ના સપ્ટેમ્બર મહીનાથી પ્લોટ નંબર-સી-૧/૧/૧૧૯/૩, જી.આઈ.ડી.સી, નર્મદાનગર, જી.ભરૂચ ખાતે આવેલ ગુજરાત પ્રદુષણ નિયંત્રણ બોર્ડની પ્રાદેશિક કચેરી, ભરૂચ ખાતે પ્રાદેશિક અધિકારી તરીકે ફરજ બજાવું છું. અમારી ફરજમાં ભરૂચ જિલ્લાના તાલુકા ભરૂચ, વાગરા, આમોદ અને જંબુસરમાં વિવિધ પર્યાવરણને લગતા કાયદાઓની અમલદારી કરાવવાની હોય છે.

ભરૂચ જિલ્લામાં જી.આઈ.ડી.સી, પાલેજના પ્લોટ નંબર-૨૦૧ થી ૨૦૪ ઉપર આવેલ શેડ જેના માસીક શ્રી મહમદ હનીફ કાદરી પાસેથી ભાડે રાખીને મે.ઈકો વેસ્ટ મેનેજમેન્ટ નામનો ઉદ્યોગ ભાટુંઆન શ્રી વાંગલા વિજય ભાસ્કર રેડ્ડી દ્વારા ચલાવવામાં આવે છે. જે એકમ જોખમી કચરાના પ્રિ-પ્રોસેસીંગ સાથે સંકળાયેલ છે. સદર એકમની વિરુદ્ધ માં આસપાસના વિસ્તારમાં લવા પ્રદુષણ થવા બાબતની ફરિયાદ મળેલ સદર ફરિયાદના સંકર્ષમાં એકમની તા.૦૮/૦૮/૨૦૨૩ ના રોજ સ્થળ તપાસ કરવામાં આવેલ. જેના રીપોર્ટના આધારે વડી કચેરી ગાંધીનગર ખાતેથી એકમને તા.૧૩/૦૯/૨૦૨૩ ના રોજ જોખમી કચરા અધિનિયમ - ૨૦૧૬ ના ભંજ બદલ પર્યાવરણ સુરક્ષા અધિનિયમ-૧૯૮૬ ના સેક્શન-૫ હેઠળ એકમને તાત્કાલિક અસરથી બંધ કરવાનો લુકમ કરવામાં આવેલ. ત્યારબાદ તેમની રિવોકેશન અરજી કરવામાં આવેલ. પરંતુ ક્લોઝર ડાયરેક્શનનું પાલન નહીં કરતાં હોય રિવોકેશન અરજી તા.૦૧/૦૧/૨૦૨૪ ના રોજ નામંજૂર કરવામાં આવેલ.

ત્યારબાદ તા.૩૦/૦૧/૨૦૨૪ નાં રોજ ગુજરાત પ્રદુષણ નિયંત્રણ બોર્ડની પ્રાદેશિક કચેરી, ભરૂચના અધિકારી ઓ દ્વારા સ્થળ તપાસ કરવામાં આવેલ અને સ્થળ તપાસ દરમ્યાન આ એકમ પરિશરમાં કોઈ જવાબદાર વ્યક્તિ મળેલ ન હોય તેમજ સ્થળ તપાસ દરમ્યાન એકમ દ્વારા કોઈપણ જાતની સદર જોખમી કચરાના નિકાલ માટેની કે કોઈપણ જાતના સુધારાત્મક પગલાં લીધેલ જણાઈ આવેલ નથી. એકમના ભાગીદારો દ્વારા તેઓની કાયદાકીય જવાબદારી હોવા છતાં બોર્ડ દ્વારા પાઠવેલ લુકમો, નોટીસ પત્રોનો કોઈ જવાબ કરવામાં આવેલ નથી. ઉપરોક્ત એકમ અસરગ્રસ્ત સ્થળ ઉપર કે જ્યાં વિપુલ માત્રામાં જોખમી કચરો બિનવારસી હાલતમાં મુકીને ચાલુ રાખેલ છે. તેમજ જોખમી કચરાનો નિકાલ કરવા માં આવેલ ન હોય, અને તે નિકાલ બાબતની કાર્યવાહી કરવામાં આવેલ ન હોય, જેથી બોર્ડ દ્વારા તા.૧૨/૦૮/૨૦૨૪ નાં રોજ એકમને લીજલ નોટીસ પણ પાઠવેલ તેનો કોઈ પ્રત્યુત્તર એકમ દ્વારા આજદિન સુધી આપવામાં આવેલ નથી. તદ્દઉપરાંત એકમની CTE અને CCA બોર્ડ દ્વારા તા.૦૩/૦૬/૨૦૨૪ ના પત્રથી રદ કરવામાં આવેલ છે.

અને બોર્ડ દ્વારા ભાડુંઆત મે.ઈકો વેસ્ટ મેનેજમેન્ટ તેમજ સદર પ્લોટ / શેડના માલિક શ્રી મહમદ હનીફ કાદરીને તા.૦૩ /૦૬/૨૦૨૪ નાં પત્રથી જોખમી કચરા અધિનિયમ-૧૯૮૬ ની કલમ-૫ હેઠળ યુનિટમાં સંગ્રહ કરેલ જોખમી કચરાનો ખાતરી કરવા, સદર જોખમી કચરાનો દિન-૧૫ માં નિકાલ કરવા માટે તેમજ કાયર લેજર્ડ અને પર્યાવરણને થતું નુકશાન અટકાવવા માટે સલામતી માટેના સુધારાત્મક પગલાં લેવા માટે ડાયરેક્શન આપવામાં આવેલ હતા. તેમ છતાં છેલ્લી મુદત તા.૧૮/૦૬/૨૦૨૪ સુધી ભાડુંઆત (મે.ઈકો વેસ્ટ મેનેજમેન્ટ) તેમજ માલિક શ્રી મહમદ હનીફ કાદરી દ્વારા બોર્ડ દ્વારા આપવામાં આવેલ ડાયરેક્શનનું પાલન કરવામાં આવેલ ન હોય અને વિપુલ માત્રામાં જોખમી કચરો બિનવારસી ઠાલવવામાં મુકીને પર્યાવરણને નુકશાન થાય તેમજ માનવ, પશુ, પક્ષી સહિતના જીવનની સલામતી જોખમી તેમજ આજુબાજુ માં આવેલ જમીન અને ઉદ્યોગોને નુકશાન થાય અને આ જોખમી કચરાથી ભવિષ્યમાં આગ લાગવાની શક્યતાથી આજુબાજુના પર્યાવરણ અને વસ્તીને જોખમ થાય તેવું જાણતા હોવા છતાં બેદરકારીભર્યું ગંભીર કૃત્ય આચરેલ હોઈ જેથી મારી આ એકમના ભાગીદાર (૧) વાંગલા વિજય ભાસ્કર રેડ્ડી રહે. બીજો માળ, અનિયા એનકલેવ, સાઉથન સ્પાર્ટ્સ રેસ્ટોરેન્ટની પાછળ, રોડ નંબર-૧૦, જુહાપુરી હિલ્સ, હેદરાબાદ-૫૦૦૦૩૩ જેનો આધાર નંબર-૫૧૯૪૭૫૦૮૦૮૩૨૫૪ તેમજ સદર પ્લોટ / શેડના માલિક મહમદ હનીફ કાદરી રહે. બી-૩૦૨, સોનિયા એપાર્ટમેન્ટ બુધ્ધાગલી ભાટવાડીનજીક, અંધેરી વેસ્ટ મુંબઈ-૪૦૦૦૬૧ તથા અન્ય જવાબદાર ઈસમો વિરૂધ્ધમાં ભારતીય ન્યાય સહિતા (બી. એન. એસ.) ની કલમ -૧૨૫, ૨૮૩, ૨૩૦, ૨૮૦ અને ૫૪ તથા પર્યાવરણ સુરક્ષા અધિનિયમની કલમ ૮, ૧૫(૧) મુજબ કાયદેસરની કાર્યવાહી થવા મારી ફરિયાદ છે. મારા સાહેદો (૧) શ્રી રાજેન્દ્રસિંહ રાજભાઉ ગાયકવાડ, મદદનીશ પર્યાવરણ ઈજનેર પ્રાદેશિક કચેરી, ભડવનાઓ સાથે આજરોજ ફરિયાદ કરવા માટે આવેલ છું. અમોએ ફરિયાદમાં લખાવ્યા મુજબની કરેલ કાર્યવાહીના કાગળોની નકલો રજુ કરું છું.

એટલી મારી ફરિયાદ લકીકત મારા લખાવ્યા મુજબની બરાબર અને ખરી છે.

- 13 Action Taken : Since the above information reveals commission of offence(s) u/s as mentioned at Item No. 2:

(સીધેલ પગલાં : ઉપરના અહેવાલની ઉપરની આઈટમ નં.(2) માં જણાવ્યા પ્રમાણેનો ગુનો બન્યાનું જાણાઈ આવતા)

(1) Registered the case and took up the investigation or(કેસની નોંધણી કરી તપાસ લાયક થઈ છે)

(2) Directed (Name of I.O.) take up the Investigation or(તપાસ કરનાર અધિકારીનું નામ):- રાજેન્દ્રભાઈ મુલજીભાઈ વસાવા Rank(હોદ્દો):- પોલીસ ઈન્સ્પેક્ટર

No.:- rmv220982 to take up the Investigation or(નંબર)

F.I.R. read over to the complainant/informant, admitted to be correctly recorded and a copy given to the complainant/informant, free of cost.

(પ્રથમ માહિતી અહેવાલ ફરિયાદી / બાતમીદારને વાંચી સંભળાવેલ છે અને ફરિયાદીએ લખાવ્યા પ્રમાણેજ નોંધવામાં આવેલ છે. તેવું ફરિયાદી / બાતમીદારે સ્વીકારેલ છે અને ફરિયાદી / બાતમીદારને તેની નકલ વિના મુલ્યે આપવામાં આવી છે.)

R.O.A.C.

(વાંચી સંભળાવવામાં આવ્યું અને તે બરાબર છે.)

Signature of Officer in charge,  
Police Station  
(પોલીસ મથકનો હવાલો ધરાવતા અધિકારીની સહી.)

- 14 Signature/Thumb Impression of the complainant/informant. Name રાજેશભાઈ દેવરામભાઈ કુભાર (નામ)  
(ફરિયાદી/બાતમીદારની સહી/અંગૂઠાની છાપ)

Rank આસીસ્ટ GPF No 151070  
(હોદ્દો) ઈસમ (જીપીએફ નંબર)  
ઈન્સ્પેક્ટર  
૨

- 15 Date and time of dispatch to 16/10/2024 15:45

the court.  
(इसियाह कौटुंबी रवाना कर्नानी तारीख अ  
ने समय)

21/05

# 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

**143**

**Guidelines on  
Implementing Liabilities for Environmental  
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अरुण कुमार मेहता, भा.प्र.से.  
 संयुक्त सचिव  
 (पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय)  
**ARUN KUMAR MEHTA, I.A.S.**  
 Joint Secretary  
 (Ministry of Environment, Forest & Climate Change)  
 &  
 अध्यक्ष  
 केन्द्रीय प्रदूषण नियंत्रण बोर्ड  
 Chairman  
**CENTRAL POLLUTION CONTROL BOARD**



भारत सरकार  
 पर्यावरण, वन एवं जलवायु परिवर्तन मंत्रालय  
 नई दिल्ली - 110003  
**GOVERNMENT OF INDIA**  
**MINISTRY OF ENVIRONMENT, FOREST &**  
**CLIMATE CHANGE**  
**NEW DELHI-110003**

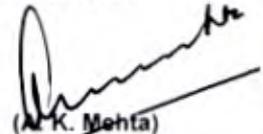
## FOREWORD

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



'परिवेश भवन', सी.बी.डी. कम-ऑफिस कॉम्प्लेक्स, पूर्वी अर्जुन नगर, दिल्ली-110032  
 'PARIVESH BHAWAN', C.B.D.-CUM-OFFICE COMPLEX, EAST ARJUN NAGAR, DELHI-110 032  
 PHONE : 22307233, TEL. FAX : 22304948, E-mail : ccb.cpcb@nic.in, akmehta@nic.in

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## 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".

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 1974)- 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 Form 14.*
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 be 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.

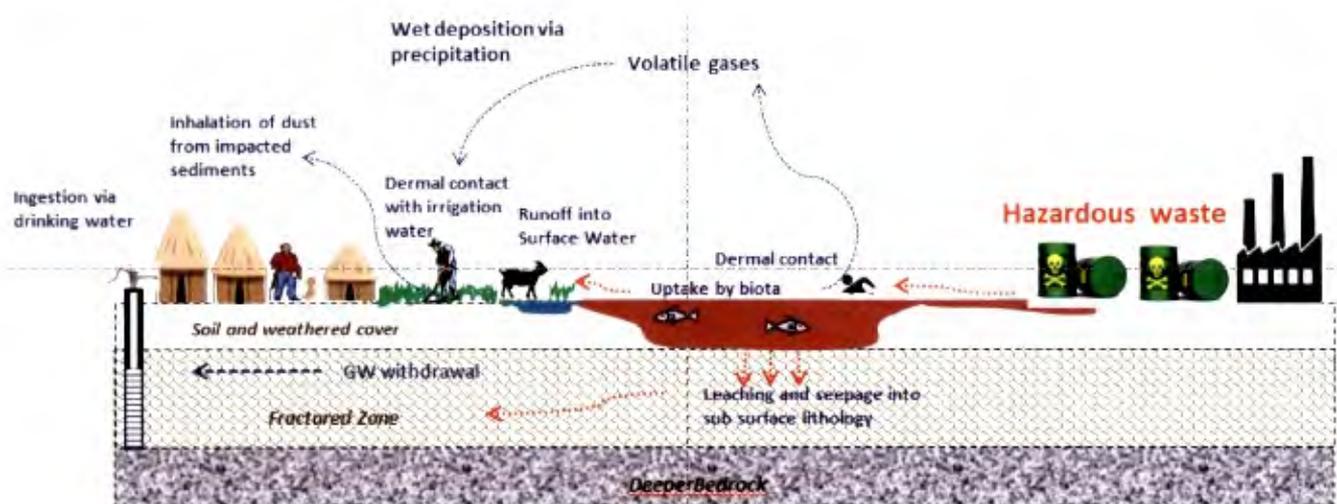
## DESCRIPTION OF IMPACTS

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, accidentally 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.

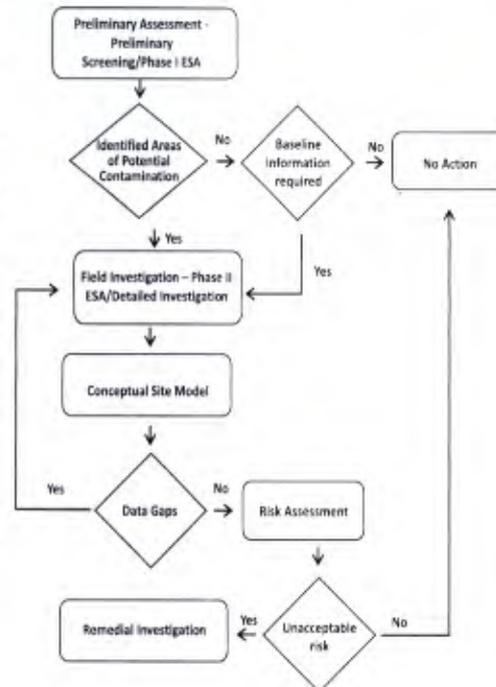
Some of the key parameters that dictate the level of assessment are given below:

- 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 from 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:*

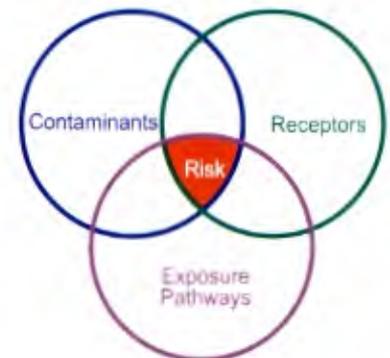
- a) **Generic Quantitative Risk Assessment (Tier 1 Risk Assessment)** – Risk assessment is carried out after ESA II using generic assessment criteria based on local, regional or national screening criteria, international criterion such as Dutch intervention values or US EPA Regional Screening Level.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

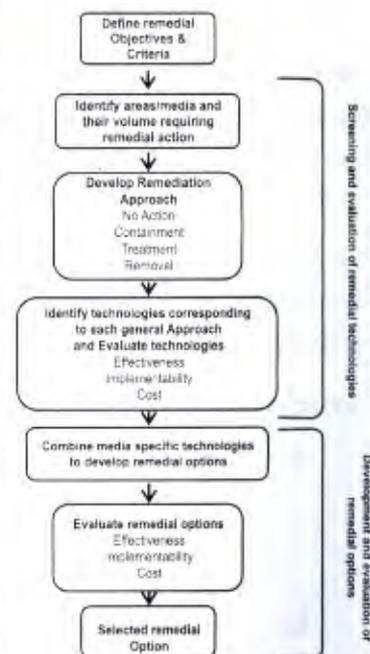
In the cases where handling or disposal of hazardous waste has resulted into contamination that impacted appropriate loss to livelihood, health related effects and impacts or damages to third party etc.; the responsible party is liable to compensate for such losses by paying costs as decided by the District 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 RESPONSE, 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 safeguarding 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 m <sup>2</sup> 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 m <sup>2</sup> ), whereas higher costs are for larger spatial impacts (greater than 10,000 m <sup>2</sup> ). 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.

## 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.

## 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 (m<sup>2</sup>), volume (m<sup>3</sup>), 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): CONTACT No.:	ORGANISATION/ AGENCY:
INCIDENT LOCATION:	
RESPONSIBLE PARTY'S NAME:	PHONE & ADDRESS:
<b>HAZARDOUS WASTE INVOLVED</b>	
FORM: SOLID <input type="checkbox"/> TARRY <input type="checkbox"/> SLURRY <input type="checkbox"/> LIQUID <input type="checkbox"/> OTHERS(Please Specify) <input type="text"/>	
QUANTITY OF HAZARDOUS WASTE INDULGED:	
CHARACTERISTICS OF HAZARDOUS WASTE INDULGED:	
EXPLOSIVE <input type="checkbox"/> CORROSIVE <input type="checkbox"/> TOXIC <input type="checkbox"/> FLAMMABLE <input type="checkbox"/>	
OTHER(Please Specify) <input type="text"/>	
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 <input type="checkbox"/> ACCIDENT <input type="checkbox"/> SPILLAGES <input type="checkbox"/> BREACH OF CONTAINMENT <input type="checkbox"/>	
OTHER(Please Specify) <input type="text"/>	
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)

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**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:

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**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:	INITIALS:	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
<b>In- Situ Biological Treatments for Soil and Sediment Contaminated Sites</b>				
1.	<p><b>Bioventing</b></p> <p>Oxygen is delivered to contaminated unsaturated soils by forced air movement (either extraction or injection of air) to increase oxygen concentrations and stimulate biodegradation.</p>	<p>Bioventing techniques have been successfully used to remediate soils contaminated by petroleum hydrocarbons, nonchlorinated solvents, some pesticides, wood preservatives, and other organic chemicals.</p>	<p>Key Cost Drivers</p> <p>1) Surface area is the primary cost driver</p> <p>Impacts the number of injection/extraction wells that are installed. The number of wells installed (and cost) increases with surface area.</p> <p>2) Soil containing sand and gravel produced significantly lower costs by reducing the number of injection/extraction wells that needed to be installed.</p> <p>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.</p>	<p>1. Low degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. Low degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p> <p>4. Low degree of general costs</p>

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
2.	<p><b>Bioremediation</b></p> <p>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.</p>	<p>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</p>	<p>Factors that affect cost include the soil type and chemistry, type and quantity of amendments used, and type and extent of contamination</p>	<ol style="list-style-type: none"> <li>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. Average degree of capital investment</li> <li>3. Average reliability &amp; low maintenance</li> <li>4. Low degree of general costs</li> </ol>
3.	<p><b>Phytoremediation</b></p> <p>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.</p>	<p>Phytoremediation may be applicable for the remediation of metals, pesticides, solvents, explosives, crude oil, PAHs, and landfill leachates</p>	<p>Key Cost Drivers</p> <ol style="list-style-type: none"> <li>1) Scale of effort</li> <li>2) Density of sampling</li> </ol> <p>Area of contamination is the primary cost driver</p> <p>Primary cost driver of sampling cost; may be directed by regulatory requirements.</p>	<ol style="list-style-type: none"> <li>1. Low degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. Low degree of capital investment</li> <li>3. Low reliability &amp; low maintenance</li> <li>4. Low degree of general costs</li> </ol>
<b>n- Situ Physical/Chemical Treatments for Soil and Sediment Contaminated Sites</b>				
4.	<p><b>Chemical Oxidation</b></p> <p>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.</p>		<p>Data can be gathered from Chemical Oxidation for Groundwater</p>	<ol style="list-style-type: none"> <li>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. Average degree of capital investment</li> <li>3. Average reliability &amp; low maintenance</li> <li>4. Average degree of general costs</li> </ol>

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
5.	<p><b>Soil Vapor Extraction</b></p> <p>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.</p>	<p>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.</p>	<p>Key Cost Drivers</p> <p>1) Economy of Scale</p> <p>Quantity of material treated has a large impact</p> <p>2) Soil Type</p> <p>Based on the number of wells required</p> <p>3) Can be radically different if no airflow treatment is required</p> <p>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.</p>	<p>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. Average degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p> <p>4. Low degree of general costs</p>
6.	<p><b>Solidification/Stabilization</b></p> <p>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).</p>	<p>The target contaminant group for in situ Solidification/Stabilization is generally inorganics (including radionuclides).</p>	<p>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</p>	<p>1. Average degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p> <p>4. Low degree of general costs</p>
<b>In-Situ Thermal Treatment for Soil and Sediment Contaminated Sites</b>				

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
7.	<p><b>Thermal Treatment</b></p> <p>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.</p>	<p>High moisture content is a limitation of standard SVE that thermally enhanced SVE that thermally enhanced 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.</p>	<p>Key Cost Drivers</p> <p>1) Soil Type</p> <p>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.</p> <p>2) Depth to Top/Thickness of Contaminated Area</p> <p>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</p>	<p>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p> <p>4. Average degree of general costs</p>
<b>Ex-Situ Biological Treatment for Soil and Sediment Contaminated Sites (assuming excavation)</b>				
8.	<p><b>Biopiles</b></p> <p>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</p>	<p>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.</p>	<p>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.</p>	<p>1. Low degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. Low degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p> <p>4. Low degree of general costs</p>
<b>Ex-Situ Physical/Chemical Treatments for Soil and Sediment Contaminated Sites (assuming excavation)</b>				
9.	<p><b>Chemical Reduction/Oxidation</b></p> <p>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.</p>			

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
10.	<p><b>Soil Washing</b></p> <p>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.</p>	<p>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.</p>	<p>Key Cost Drivers</p> <p>1) Economy of Scale</p> <p>Quantity of material treated has a large impact</p> <p>2) Processor speed</p> <p>Also depends on the amount of waste being processed</p>	<p>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p> <p>4. Average degree of general costs</p>
11.	<p><b>Solidification/ Stabilization</b></p> <p>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).</p>	<p>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</p>	<p>Key Cost Drivers</p> <p>1) Type of Waste</p> <p>Moisture content in the sludge drives up costs compared to solid</p> <p>Contaminant concentration and type determine the amount of reagents added to the waste to attain the required treatment standards</p> <p>2) Size of the mobile s/s system</p> <p>Choosing the correct size mobile s/s system to adequately handle the throughput of waste volume</p>	<p>1. Average degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p> <p>4. Low degree of general costs</p>
<b>Ex- Situ Thermal Treatments for Soil and Sediment Contaminated Sites (assuming excavation)</b>				
12.	<p><b>Incineration</b></p> <p>High temperatures, 870-1,200 °C, are used to combust (in the presence of oxygen) organic constituents in hazardous wastes</p>	<p>Incineration is used to remediate soils contaminated with explosives and hazardous wastes, particularly chlorinated hydrocarbons, PCBs, and dioxins.</p>	<p>Key Cost Drivers</p> <p>1) Type of waste</p> <p>Debris &lt; Soil &lt; Sludge &lt; Sediment</p> <p>2) Quantity</p> <p>There is only a INR 18000 - INR 24000 gap in cost for quantities ranging from 5,000 - 100,000.</p>	<p>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. Average reliability &amp; low maintenance</p> <p>4. High degree of general costs</p>

Sr No	Remediation Technologies	Applicability	Assumptions	Comments
13	<p><b>Thermal Desorption</b></p> <p>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.</p>	<p>Thermal desorption systems have varying degrees of effectiveness against the full spectrum of organic contaminants.</p> <p>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.</p> <p>The target contaminants for High Temperature Thermal Desorption (HTTD) are SVOCs, PAHs, PCBs, and pesticides; however, VOCs and fuels also may be treated, but treatment may be less cost-effective.</p>	<p>Key Cost Drivers</p> <p>1) Economy of Scale</p> <p>Quantity of material treated has a large impact</p> <p>2)Moisture content</p> <p>Increases required heat input (increasing fuel costs)</p>	<p>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. Average reliability &amp; low maintenance</p> <p>4. Average degree of general costs</p>
<b>Containment for Soil and Sediment Contaminated Sites</b>				
14.	<p><b>Landfill Cap</b></p> <p>Landfill caps are used for contaminant source control.</p>	<p>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.</p>	<p>Landfill caps are generally the least expensive way to manage the human health and ecological risks effectively</p>	<p>1. Average degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p> <p>4. Low degree of general costs</p>
<b>Other Treatment for Soil and Sediment Contaminated Sites</b>				
15.	<p><b>Excavation, Retrieval, and Off-Site Disposal</b></p> <p>Contaminated material is removed and transported to permitted off-site treatment and disposal facilities. Pretreatment may be required.</p>	<p>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</p>	<p>These estimates include excavation/removal, transportation, and disposal at a RCRA permitted facility. Additional cost of treatment at disposal facility may also be required. Excavation and off-site disposal is a relatively simple</p>	<p>1. Low degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. Low degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p>

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.	
<b>In-Situ Biological Treatments for Groundwater and Surface Water Contaminated Sites</b>				
16.	<p><b>Bioremediation</b></p> <p>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.</p>	<p>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.</p>	<p>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.</p>	<ol style="list-style-type: none"> <li>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. Average degree of capital investment</li> <li>3. Average reliability &amp; low maintenance</li> <li>4. Low degree of general costs</li> </ol>
17.	<p><b>Monitored Natural Attenuation</b></p> <p>Natural subsurface processes—such as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials—are allowed to reduce contaminant concentrations to acceptable levels.</p>	<p>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.</p>	<p>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</p>	<ol style="list-style-type: none"> <li>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. Average degree of capital investment</li> <li>3. Average reliability &amp; low maintenance</li> <li>4. Low degree of general costs</li> </ol>

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18.	<p><b>Phytoremediation</b></p> <p>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.</p>	Phytoremediation can be used to clean up organic contaminants from surface water, ground water, leachate, and municipal and industrial wastewater.	<p>Key Cost Drivers</p> <p>1) Scale of effort</p> <p>Area of contamination is the primary cost driver</p> <p>2) Tree size (maturity) is the secondary cost driver.</p>	<p>1. Low degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. Low degree of capital investment</p> <p>3. Low reliability &amp; low maintenance</p> <p>4. Low degree of general costs</p>
<b>In-Situ Physical/Chemical Treatments for Groundwater and Surface Water Contaminated Sites</b>				
19.	<p><b>Air Sparging</b></p> <p>Air is injected into saturated matrices to remove contaminants through volatilization</p>	The target contaminant groups for air sparging are VOCs and fuels.	<p>Key Cost Drivers</p> <p>1) Surface area (contaminant orientation)</p> <p>Surface area of contamination is the primary cost driver, and directly affects the quantity of air sparge points.</p> <p>2) Depth to Contamination</p> <p>Depth is the secondary cost driver. Cost increases with depth since it impacts the drilling costs.</p>	<p>1. Low degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. Low degree of capital investment</p> <p>3. High reliability &amp; low maintenance</p> <p>4. Low degree of general costs</p>
20.	<p><b>Bioslurping</b></p> <p>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.</p>	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.).		<p>1. Low degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. Low degree of capital investment</p> <p>3. Average reliability &amp; low maintenance</p> <p>4. Low degree of general costs</p>
21.	<p><b>Chemical Oxidation</b></p> <p>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.</p>		<p>Key Cost Drivers</p> <p>1) Economy of Scale</p> <p>Quantity of material treated has a large impact</p> <p>2) Moisture content in waste</p> <p>Slight increase in costs between soil and sludge</p> <p>3) Contaminant concentrations</p> <p>High influent and low effluent concentrations will drive up costs</p>	<p>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. Average degree of capital investment</p> <p>3. Average reliability &amp; low maintenance</p> <p>4. Average degree of general costs</p>

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22.	<p><b>Dual Phase Extraction</b></p> <p>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.</p>	<p>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.</p>	<p>Key Cost Drivers</p> <p>1) Soil Type</p> <p>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.</p> <p>2) Depth to Base of Contamination</p> <p>Depth to the base of contamination is the secondary driver, as an increased thickness and depth of contaminated groundwater increases cost.</p>	<p>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. Average reliability &amp; low maintenance</p> <p>4. Average degree of general costs</p>
23.	<p><b>In-Well Air Stripping</b></p> <p>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.</p>	<p>The target contaminant groups for vacuum vapor extraction are halogenated VOCs, SVOCs, and fuels.</p>	<p>Data Not Available</p>	<p>1. Average degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. Average reliability &amp; low maintenance</p> <p>4. Average degree of general costs</p>
24.	<p><b>Passive/Reactive Treatment Walls</b></p> <p>These barriers allow the passage of water while causing the degradation or removal of contaminants.</p>	<p>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.</p>	<p>Key Cost Drivers</p> <p>1) Economy of Scale</p> <p>2) Quantity of material treated has a large impact</p> <p>3) Width of the plume to be treated</p> <ul style="list-style-type: none"> <li>• Choice of supplemental amendments</li> <li>• Additional monitoring required by regulators</li> </ul>	<p>1. Average degree of Operation &amp; Maintenance (O&amp;M) intensity</p> <p>2. High degree of capital investment</p> <p>3. Low reliability &amp; low maintenance</p> <p>4. Average degree of general costs</p>

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<b>In- Situ Thermal Treatment for Groundwater and Surface Water Contaminated Sites</b>				
25.	<p><b>Thermal Treatment</b></p> <p>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.</p>	<p>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.</p>	<p>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.</p>	<ol style="list-style-type: none"> <li>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. High degree of capital investment</li> <li>3. Average reliability &amp; low maintenance</li> <li>4. Average degree of general costs</li> </ol>
<b>Ex- Situ Biological Treatment for Groundwater and Surface Water Contaminated Sites</b>				
26.	<p><b>Constructed Wetlands</b></p> <p>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.</p>	<p>Constructed wetlands have most commonly been used in wastewater treatment for controlling organic matter; nutrients, such as nitrogen and phosphorus; and suspended sediments.</p>	<p>Data Not Available</p>	<ol style="list-style-type: none"> <li>1. Average degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. High degree of capital investment</li> <li>3. NA</li> <li>4. Average degree of general costs</li> </ol>
<b>Ex- Situ Physical/Chemical Treatment for Groundwater and Surface Water Contaminated Sites</b>				
27.	<p><b>Adsorption/Absorption</b></p> <p>In liquid adsorption, solutes concentrate at the surface of a sorbent, thereby reducing their concentration in the bulk liquid phase.</p>	<p>The target contaminants groups for adsorption/absorption processes are most organic contaminants and selected inorganic contaminants from liquid and gas streams.</p>		<ol style="list-style-type: none"> <li>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. Average degree of capital investment</li> <li>3. Average reliability &amp; low maintenance</li> <li>4. High degree of general costs</li> </ol>
28.	<p><b>Advanced Oxidation Processes</b></p> <p>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.</p>	<p>Practically any organic contaminant that is reactive with the hydroxyl radical can potentially be treated.</p>	<p>Factors that influence the cost to implementing UV/oxidation include:</p> <ul style="list-style-type: none"> <li>- Types and concentration of contaminants (as they affect oxidizer selection, oxidizer dosage, UV light intensity, and treatment time).</li> <li>- Degree of contaminant destruction required.</li> <li>- Desired water flow rates.</li> <li>- Requirements for pretreatment and/or post-treatment.</li> </ul>	<ol style="list-style-type: none"> <li>1. High degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. High degree of capital investment</li> <li>3. Average reliability &amp; low maintenance</li> <li>4. Average degree of general costs</li> </ol>

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29.	<b>Air Stripping</b> 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 · m <sup>3</sup> /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.	<b>Granulated Activated Carbon (GAC)/Liquid Phase Carbon Adsorption</b> 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.	<b>Groundwater Pumping/ Pump and Treat</b> 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.	<b>Ion Exchange</b> 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.	<b>Precipitation/ Coagulation/Flocculation</b> 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

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	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.	<b>Separation</b> 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.		<ol style="list-style-type: none"> <li>1. Average degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. High degree of capital investment</li> <li>3. High reliability &amp; low maintenance</li> <li>4. High degree of general costs</li> </ol>
<b>Containment for Groundwater and Surface Water Contaminated Sites</b>				
35.	<b>Physical Barriers</b> 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.	<p>Factors that have the most significant impact on the final cost of soil-bentonite slurry wall installation include:</p> <ul style="list-style-type: none"> <li>-Type, activity, and distribution of contaminants.</li> <li>-Depth, length, and width of wall.</li> <li>-Geological and hydrological characteristics.</li> <li>-Distance from source of materials and equipment.</li> <li>-Requirements for wall protection and maintenance.</li> <li>-Type of slurry and backfill used.</li> <li>-Other site-specific requirements as identified in the initial site assessment (e.g., presence of contaminants or debris).</li> <li>-Planning, permitting, regulatory interaction, and site restoration.</li> </ul>	<ol style="list-style-type: none"> <li>1. Average degree of Operation &amp; Maintenance (O&amp;M) intensity</li> <li>2. High degree of capital investment</li> <li>3. High reliability &amp; low maintenance</li> <li>4. Low degree of general costs</li> </ol>