



Alkali Manufacturers Association of India

SAFE DISPOSAL OF SOLID WASTES IN CHLOR-ALKALI INDUSTRY

Introduction

The chlor-alkali industry generates many different types of Hazardous and Non-Hazardous Wastes from process and non-process activities.

Process Solid Waste: Process type solid wastes could be defined as those which are generated as a result of physical, chemical or biological reaction within the process cycle from raw material treatment to the final waste disposal. In caustic soda plants, the solid wastes generated from the process are mainly due to raw material treatment, wherein chemicals are added to the brine for removing undesired impurities. These chemicals react with the impurities forming chemical compounds and thereafter settle as precipitate. The process of clarification also generates sludge. This is further treated through a rotary vacuum drum filter (RVDF) which separates the liquid and solid fractions. The liquid fraction is recycled to the process, while the solid fraction is transported to secure landfill area after testing. Sludge is also generated in small quantities from the Effluent treatment plant. The ETP sludge is also discarded at the SLF site facility. The solid fraction left after the MEE facility in ZLD plants are also classified as solid wastes.

The brine sludge is presently classified as a hazardous waste due to its inclusion in the Hazardous Waste Management Rules, 2016 and amendments thereto. The brine sludge contains barium among other chemicals which are well within limits prescribed.

Major wastes are generated during the brine purification and consist of used materials such as pre-coat and feed material made of cellulose. The pre-coat filter sludge from the brine softener consists mainly of alpha-cellulose, contaminated with iron hydroxide and silica. Membrane plants report a figure of 0.6 Kg/t for sludges from brine softening. Besides, spent membranes and gaskets from membrane cells become waste after their service life. The membranes have a lifetime of approximately 4 years. Electrodes are sent back to supplier for coating every 7-8 years. Membranes are currently preserved in 10% caustic solution. These are then stored locally within the plant.

Brine filtration sludges are concentrated/dewatered in filter presses, rotary drum vacuum filters or centrifuges. Brine sludge generation is about 20-30 kg / ton of caustic soda. It may vary depending upon process conditions and raw material quality in different plants. In some of the plants the quantity is even 50 kg per ton. Brine Sludge consists of precipitated impurities of the Salt, is drained from brine settling tank. The dewatered sludge in cake form is transported by Tractor Trolleys to the interim storage facility and then disposed to TSDF or captive SLF which are designed as per existing guidelines of CPCB. The residual water is fed back into the brine system. The hazardous solid wastes, like brine sludge, are managed through sanitary/lined landfills.

Some units have deployed Sulphate Removal Systems (SRS) and Multi-effect Evaporator. There are few plants which operate without the use of Barium in brine saturation. Industry has undertaken focused interventions as per regulatory requirements and compliances as per CTO, Environmental Clearances, etc.

Non-Process Solid Waste: These are general type of metal and non-metal parts and scraps which are generated during retrofitting, maintenance, upgrading and other housekeeping operations. The membrane cell processes generate solid wastes from scrapping of cell parts including cell covers, piping, used membranes, cathodes, and anodes. The cell parts that are discarded are landfilled on-site or shipped off-site to a third-party recovery facility. The cathodes may be refurbished and reused, particularly those made of nickel, but it depends on the cell technology. Solid wastes are also generated through insulation and electrical components such as used cables, conduits, and wires. Plants also generate construction and demolition wastes as well as plastic wastes. Filter calendars and pickings are also generated as non-process solid wastes from caustic soda plants.

Captive SLF Facility

In case a Chlor-Alkali unit is exploring to establish a captive SLF facility, the following CPCB publications will help:

- Guidelines for the Selection of Site for Landfilling
(<https://cpcb.nic.in/displaypdf.php?id=aHdtZC9QdWJsaWNhdGlvbGl80MDhfc2VjMTFfMjMucGRm>)
- Criteria for Hazardous Waste Landfills
(<https://cpcb.nic.in/displaypdf.php?id=aHdtZC9QdWJsaWNhdGlvbGl80MTRfc2VjMTFfMTcucGRm>)
- CPCB Guidelines for Proper Functioning and Upkeep of Disposal Sites
(<https://cpcb.nic.in/displaypdf.php?id=aHdtZC9QdWJsaWNhdGlvbGl80MDBfc2VjMTFfMzEyLnBkZg==>)

Common TSDF

As Chlor-alkali industry is sending many types of Hazardous Wastes to TSDFs, it is pertinent to select a good TSDF with lower cost and complying to the most regulations. CPCB has published a Guidance Document for Conducting Environment Audit of Common TSDFs (https://cpcb.nic.in/uploads/hwmd/Guidelines_HW_3.pdf) which gives comprehensive idea about different requirements for TSDF which will help Chlor-alkali unit for info on TSDF requirements.

CPCB has also published a document on "Performance Evaluation and Monitoring of the Common Hazardous Waste Treatment, Storage and Disposal Facilities including Common Hazardous Waste Incinerators" (https://mpcb.gov.in/sites/default/files/hazardous-waste/CHWTSDF/Protocol_for_CHWTSDF.pdf). Any industry which has established its own captive SLF may look into the provisions for a good performance criterion.

Some major Solid Wastes generated in the industry and the Applicable Rules and Guidelines:

- **Hazardous and Other Wastes (Management and Transboundary Movement) Rules 2016**
- **Biomedical Waste (Management and Handling) Rules, 2016**
- **Solid Waste Management Rules, 2016**----For Municipal waste (domestic and commercial wastes)
- **Plastic Waste Management Rules, 2016 (and amendments thereafter) (earlier 1999, 2003) and EPR Guidelines issued under PWM Rules.**
- **E-Waste (Management and Handling) Rules, 2016:**
- **The Construction and Demolition Waste Management Rules 2016**
- **Batteries (Management & Handling) Rules, 2001**
- **Flyash Notification, 1999 (and amendments thereafter) ---(from CPP and Boilers)**

The wastes which are generated from the production associated processes or activities, are already categorized in the Schedule-I, Schedule-II (Class-A, Class-B, Class-C---based on characterization through

comprehensive analysis) and Part C of Schedule-III (for wastes not specified in Part A but exhibit hazardous characteristics) of the HW Rules.

Sr. No.	Waste Name	Process /Plant	HW Rules Category	Disposal Methods
1	Brine Sludge	Production of caustic soda and chlorine	Category-16.3	CTSDf /Secured Landfill
2	Spent Carbon	Water treatment, Boilers soot spent activated carbon sieves from Nitrogen Plant	Category-36.2	To CTSDf (Incineration/Co-processing)
3	Discarded Contaminated Containers/barrels/Liners, Bags used for Haz Chemicals or wastes	All Plants containers/ bags contaminated with chemicals	Category-33.1	SPCB approved Recyclers/Co- processing
4	Used/Spent Oil	Various processes, Lubrication, Transformers etc.	Category-5.1	To SPCB authorized recyclers
5	Oil-Soaked Cotton Waste, Wastes or residues containing oil	Various maintenance activities	Category-5.2	To CTSDf-Incineration facility/Co-processing
6	ETP Sludge, MEE/ATFD salt waste, Reactor/tank cleaning residues from various plants	Wastewater treatment, reactor/tanks	Category-35.3	To CTSDf
7	Exhausted Molten Salt from flakes production, PAC Process Wastes & Residues, SBP Process Wastes & Residues, Process Wastes from CaCl ₂ Plant	Respective plants/processes	Category-16.2	To CTSDf
8	ALCP Dross Waste	Aluminum Chloride plant	Category-11.5	Reuse in Process, CTSDf/ Authorized end user
9	Spent Ion-exchange resins/other resins	CAP & VAP	Category-35.2	To CTSDf
10	Oil and grease skimming residues	CAP & VAP	Category-35.4	
11	Asbestos waste	CAP & VAP	Category-15.2/ Z16	To CTSDf
12	Spent Acid (HCl, H ₂ SO ₄)	CPW, CA	Category-B15, Sch-II	Sold for User having permission under Rule-9
13	Glass Wool	Various Processes, Insulation uses	Category-Z 22, Sch-II	To be disposed to CTSDf
14	Bleach Liquor	HSBP plant		Send to PCB authorized end user under Rule-9
15	Bag Filters discarded	CPP, other plants	Cat-35.1	SPCB approved CTSDf or co-processing
16	Phosphoric Acid ETP Sludge	PA plant	Other wastes	Sold/Used as filler in fertilizer or disposal to SPCB approved CTSDf as per Consent condition.

Other Wastes identified under various applicable rules:

Sr.no	Waste type	Generation Plant/Point	Waste Category as per the respective rules	Disposal Modes /Utilization
1	Biomedical Waste	OHC/ Colony Houses	Biomedical Waste	Common Biomedical Waste Management facility
2	Plastic Waste	Procured Containers, Packaging	Plastic Waste	To SPCB/CPCB authorized Recyclers/Re-processors/Co-processing
3	FRP waste	Discarded FRP vessels pipes and other equipment		To co-processing in Cement industries as AFR under CPCB FRP guidelines
4	Thermoset Plastics, SMC sheet and related wastes plastics	Plastic uses in process equipment /containers/packaging		Waste to Energy/CTSDf
5	Membrane Filters and Cartridge	RO & Water Treatment Plants	Solid Wastes	SPCB registered recyclers
6	Lead Acid Battery	Electrical	Battery waste-Acid Contained	To Supplier/Manufacturer as per the agreement for buy back
7	E-Waste	Electricals, Electronics, and IT discarded wastes	E-waste	To CPCB/SPCB registered E-Waste recyclers
8	Construction and Demolition Waste	Civil Construction and Demolition	C & D Waste (applicable for generation of >20 TPD or 3000 Tons per Project	Reuse/to be disposed to municipal solid waste landfills as per agreement with local authority or filling low lying area
9	STP Sludge	Sewage treatment plants	STP sludge	Used as manure for gardening
10	Garbage Waste	Plant/Colony Area Cleaning	MSW/Domestic waste	To be disposed to MSW landfills as per agreement with local authority
11	Food Waste	Canteen/Guest House	Food Waste	Composting/Vermi-composting
12	Flyash/Bed ash	CPP	As per Flyash Rules	Disposed for various uses as per Rules

Storage and handling of hazardous materials

Both hazardous and non-hazardous materials generated within the project facility shall be temporarily accommodated in appropriate units placed within the project facility built/made in line with the safety, health and environmental standards.

The size of these temporary units would depend on the quantity and type of hazardous waste materials like asbestos, PCB, oils, fuels, etc., with appropriate storage capacities placed in the project facility in compliance with the Hazardous Waste Management and Handling Rules. Also, if gas cylinders must be stored in the facility, rules applicable for gas cylinders under the Explosives Act shall be followed. Later, these materials must be disposed off at a centralized disposal facility with utmost care following safety norms. Each unit in the facility should have fire hydrant system to handle fire hazards.

Hazardous Waste Characterization

Characterization should be undertaken to understand the physico-chemical properties and/ or composition of the different wastes through proper sampling and analysis. Sites should follow standard methods as made available by the local regulatory authority for hazardous waste sample collection, preservation and analysis. CPCB has published a 'Manual on Sampling, Analysis and Characterization of Hazardous Waste' (<https://cpcb.nic.in/displaypdf.php?id=aHdtZC8xOS5wZGY=>). Internationally accepted and most widely used standard like 'Test Methods for Evaluating Solid Waste, Physical/Chemical Methods (SW-846),' has also been published by the US EPA.

Hazardous Waste Compatibility Assessment

Hazardous waste compatibility assessment should be undertaken for:

- Potential mixing of at least two different hazardous wastes, and
- Reaction of the hazardous waste with the material of construction of the storage receptacle.

The results of hazardous waste compatibility assessment should be applied for segregation and subsequent storage of hazardous wastes through the derived compatibility matrix.

Hazardous Waste Segregation

The following aspects should be considered for the segregation of hazardous waste:

- All hazardous waste should be segregated from non-hazardous waste to prevent contamination recoverable material and of physical environmental resources such as land and water. This will also prevent inadvertent disposal of hazardous waste into less regulated municipal solid waste landfills, where co-disposal is not permitted.
- For hazardous wastes, segregation at source will depend on criteria such as physicochemical characteristics, hazard class, compatibility, recovery opportunity (material and/or energy) or disposal pathway, as applicable. These criteria are explained in Table below.

Table: Hazardous Waste Segregation Criteria

Criteria	Application
Basic physico-chemical Characteristics	Segregate hazardous waste and bio-medical waste, although some of the waste from each group may have a similar disposal pathway, such as incineration.
Hazard class	Air or moisture reactive chemicals should be specially handled since they pose high chemical hazard.
Compatibility	Chemically incompatible wastes should be segregated to avoid unwanted consequence of chemical reaction.
Recovery opportunity	Hazardous wastes, which could undergo co-incineration, should be segregated to maximize their material and/or energy recovery value.
Disposal pathway	Hazardous wastes may be disposed into secured engineered landfill with or without treatment. Such wastes should be properly segregated.

Hazardous Waste Storage

Hazardous waste storage implies temporarily keeping the waste, prior to transportation, treatment and disposal. Hazardous wastes should be stored in such a way that they remain isolated and do not pose risk of contamination of the environment, exposure to human health and any other hazards that could arise out of them.

It is recommended that sites accomplish isolated storage of hazardous wastes by:

- 1. Proper containment** – individual storage in containers or bulk storage inside sheds according to classification and characteristics.
- 2. Keeping distance from the primary working areas** – manufacturing areas and peoples movement areas.
- 3. Keeping distance from sensitive receptors** – groundwater abstraction structures, surface water bodies and downwind habitat.
- 4. Keeping distance from electrical installations** – high tension lines and transformers to prevent fire hazard.
- 5. Providing structurally secured and stable enclosures** – properly constructed weather resistant sheds with retaining walls, impervious floors and leak proof roofing in minimum.
- 6. Imposing restricted access** – physically demarcating and barricading all around the area with limited authority of entry.

Provision should be made for the storage of at least 50% of the peak annual generation of hazardous waste. Adequate space should be earmarked to store hazardous wastes depending upon the predicted generation. A contingency plan should also be made in case any hazardous waste takes longer time for disposal beyond the in-house storage duration permit as mentioned by the regulatory authorities in the permit.

Bio-medical wastes should not be stored beyond 2 days (48 hours) or as generally required by the local regulatory authority.

On-Site Waste Transportation

The following aspects should be considered for on-site transportation of hazardous waste:

- Collect waste in pre-determined and compatible receptacles (e.g. bags for dry powder, granulated waste or bio-medical waste; barrel/ IBC for liquid slurry or semisolid waste).

- Bulk, non-flowable and de-watered waste such as drained Effluent Treatment Plant (ETP) sludge from sludge drying bed should be directly loaded into the transportation vehicle by using suitable earthmoving equipment (e.g. backhoe loader).
- Bagged or containerized waste should be transported to the storage area by carts or low-bed small trucks. Loading and unloading of such waste should be done by mechanical means (e.g. forklift with pallet).
- Hazardous waste directly loaded into transportation vehicles should be unloaded and properly stockpiled in a bulk storage shed.
- Drums should not be rolled, rather drum handling equipment (e.g. drum dolly and drum lifter) should be used.
- Packing, covering and securing of the containment should be undertaken to avoid leaks and spills during movement. The load securing should be done by using rope, strap and brace.
- Transportation vehicles should remain dedicated for their use and be provided with tarpaulin cover.
- Portable firefighting equipment and spark arresters should be provided in hazardous waste transportation vehicle.
- Suitably trained, licensed and authorized drivers should be used for hazardous waste transportation (including having emergency response training).
- All handlers and operators engaged in hazardous waste loading and unloading for transportation should have emergency response training.

Off-site Waste Transportation

The off-site transportation of hazardous waste means sending the stored hazardous waste from site to any approved off-site TSDF. The off-site transportation service may be provided by the contractor operating the TSDF as an integral part of their service. The site should deploy contractor for off-site transportation of hazardous waste after conducting ample due diligence including appropriate licenses, permits and consents for relevant hazardous waste types. The off-site transportation service may also be provided by other contractor (transporter) duly approved by the regulatory body for this purpose and having agreement to any TSDF to transfer hazardous waste from generator. The following aspects should be considered for off-site transportation of hazardous waste.

Containment

1. Containers and packaging materials should be strong enough to not become defective during transportation.
2. Containers and packaging materials should be closed to avoid hazardous waste spills during transportation due to vehicle vibrations, jerks and moving on uneven road surfaces.
3. Bagged or containerized hazardous waste should be loaded into the transportation vehicle using suitable mechanical equipment.

Vehicle Loading

1. Placement of hazardous waste on the transportation vehicle should ensure uniform distribution of the load without any overhanging, perching or leaning condition.
2. The load should be secured with straps, clamps and braces, if required.

Vehicle Movement

1. Transportation of hazardous waste should be in accordance with the provisions of the respective national Motor Vehicle Acts/ Rules.
2. Suitably trained, licensed and authorized drivers should be used for hazardous waste transportation (including emergency response training).
3. In case of inter-regional/ state transportation of hazardous waste, "No Objection Certificates" (NOCs) should be obtained from the concerned regulatory authorities at the hazardous waste generation location, intermediate location and final disposal location.
4. Manifest system should be used for off-site transportation of hazardous waste.

Safety

The following safety requirements should be followed:

1. Adequate PPE for the driver and assistant, fire extinguishers, first aid kit and spill control kit should be provided.
2. Ensure understanding of maximum load capacity of vehicle and maximum allowable quantities of each hazardous waste stream.
3. In case more than one type of wastes is being transported through the same transportation vehicle, compatibility of wastes must be reviewed.
4. Transportation vehicles should be labelled with the words 'Hazardous Waste' or 'Biomedical Waste' in English and local languages, written in front and on the body. The vehicle should also display the names of the facilities from where the hazardous wastes have been collected and where it is being sent. For bio-medical waste carrying vehicles, the biohazard and cytotoxic symbols should be displayed.
5. Transportation vehicles should be colour coded for easy identification.
6. A Transportation Emergency (TREM) card should be provided by the company, showing details of hazardous wastes, emergency procedures and emergency contact details.
7. Portable firefighting equipment and spark arresters should be provided in hazardous waste transportation vehicles.

Hazardous Waste Transportation

CPCB has published [Guidelines for Transportation of Hazardous Wastes](https://cpcb.nic.in/displaypdf.php?id=aHdtZC9QdWJsaWNhdGlvbl8zOTlfc2VjMTFfMzluGGRm) (<https://cpcb.nic.in/displaypdf.php?id=aHdtZC9QdWJsaWNhdGlvbl8zOTlfc2VjMTFfMzluGGRm>)

Hazardous Waste Treatment

It is the process to change the characteristics (physical, chemical or biological) of the waste in such a way to destroy (or minimize) its detrimental effects on the environment and health.

On-site Hazardous Waste Pre-treatment

Wherever required, sites should undertake the on-site pre-treatment of hazardous waste for:

- Volume reduction – One of the methods of hazardous waste volume reduction is to increase the density without making any modification in the chemical characteristics.
- Acute hazard and toxicity reduction – One of the methods is chemical pre-treatment and proper containerization.

- Acute hazard reduction – This can be achieved through physical encapsulation.

The following general aspects for on-site pre-treatment of hazardous waste should be typically considered:

1. Identify and prepare inventory of the hazardous wastes that require on-site pre-treatment.
2. Identify pre-treatment processes; associated hazards and risks, pre-treatment technology including the means to mitigate the identified hazards and risks.
3. Identify licensing or permitting requirements for pre-treatment activities.
4. Identify trainings required for pre-treatment activities.
5. Install pre-treatment facility and associated infrastructure.
6. Prepare procedures and work instructions for operational control.
7. Physically demarcate and barricade the area around the pre-treatment facility with limited authority of entry.
8. Check on associated machinery for safety measures (such as guards, electrical isolation etc.) and suitably maintained in line with manufacturers guidelines.

Treatment of Hazardous Waste at Captive Facility

The following regulatory prerequisites should be typically achieved prior to implementation of full-scale on-site treatment of hazardous waste:

1. Physico-chemical characterization – Comprehensive analysis of hazardous waste to be sent to the captive facility should be undertaken by a certified laboratory for analysis of various parameters.
2. Identification of chemical(s) of concern or target pollutant(s) – The analysis results should be compared with the regulatory criteria to identify exceedance of parameters beyond the regulatory limit. This should indicate the chemical(s) of concern or the target pollutant(s) for which the treatment must be provided.
3. Assign treatment and disposal pathway – Depending upon the chemical(s) of concern or the target pollutant(s), the specific treatment process, as approved by the regulatory requirement should be selected.
4. The on-site treatment of hazardous waste at a captive facility should be developed only to manage the specific waste(s).
5. For bio-medical waste, as per the regulatory criteria, it should be commonly disinfected, autoclaved and shredded or incinerated. (common treatment facility)

Off-site Hazardous Waste Treatment and Disposal

Prior to availing the service of an off-site facility for treatment and disposal of hazardous waste, each site should ensure the following compliance requirements under applicable regulations including their validity:

1. Consent to Establish and Consent to Operate
2. Authorization to collect, transport, treats and dispose hazardous waste
3. Commercial license
4. Transportation permit
5. Fire license
6. Legal metrology license
7. Labor license
8. Workers' insurance coverage
9. Public liability insurance

10. Escrow account

11. Any other EHS performance compliance as required by the local environmental regulatory authority

Hazardous Waste Transportation Checklist

Sr. No.	Question	Yes/No	Additional Information
On-site Transportation			
1	Are dedicated vehicles used in on-site transportation?		
2	Is the vehicle having valid fitness certificate and checked for its fitness before transporting hazardous waste?		
3	Is the driver authorized for hazardous waste transportation and having emergency preparedness training?		
4	Are spark arresters, portable firefighting equipment, spill control kits and wheel chock available in the vehicle?		
5	Is the vehicle leak and spill-proof if hazardous waste is directly loaded into the vehicle?		
6	Is the equipment available for hazardous waste loading/unloading during transportation and checked for safe use?		
7	Are maximum allowable loads for each waste (individually or cumulatively) understood and adhered to?		
8	Is the vehicle having roll-on / roll-off cover?		
9	Is the emergency contact no. available with the driver?		
10	Is the vehicle provided with means to secure the waste during transportation?		
11	Is the empty container brought to the hazardous waste collection point compatible, properly inspected and free from any damage?		
12	Is the empty container brought to store hazardous waste properly labelled?		
13	Is the weighing record of waste transported maintained?		
14	Are the persons, other than driver, involved in hazardous waste loading, transportation and unloading trained for emergency response?		
15	Is any leak and spill happening during hazardous waste transportation reported and corrective action taken?		
Off-site Transportation – All checklist points mentioned above and including those mentioned below.			
17	Is the vehicle registered under local Motor Vehicle Authority?		
18	Is the off-site transporter approved by the regulatory authority for transportation of hazardous waste?		
19	Does the vehicle display from which off-site facility it is arriving?		
20	Are maximum allowable loads for each waste (individually or cumulatively) understood and adhered to?		
21	Does the vehicle have appropriate signage to indicate hazardous waste transportation?		
22	Is the TREM card properly filled up for off-site transportation of hazardous waste?		
23	Is the waste packed and covered well enough to prevent any leak and spill during off- site transportation?		

25	Is emergency response equipment within the vehicle?		
26	Is the driver trained in emergency response?		

Hazardous Waste Off-site TSDF Compliance Assessment Checklist

Sr. No.	Question	Yes/No	Additional Information
1	Does the facility have a valid Consent to Establish?		
2	Does the facility have a valid Consent to Operate and Authorization to collect, transport, treat and dispose hazardous waste?		
3	Does the facility have infrastructure to handle and manage the type of hazardous waste to be sent?		
4	Does the facility have a valid commercial license?		
5	Does the facility have a valid permit to transport hazardous waste?		
6	How will the waste be transported to the facility? Does the facility use their own vehicles or subcontracted carrier? Who is the sub-contracted carrier?		
7	How is chain of custody management handled for the transfer and disposal of waste streams?		
8	How are waste materials accepted at the facility?		
9	Does the facility have a regulatory approval to use a sub-contracted transporter and valid agreement with them?		
10	Does the facility have a valid legal metrology license for weighing incoming consignment of hazardous waste?		
11	Does the facility have a valid labour license?		
12	Does the facility have valid workers insurance coverage?		
13	Does the facility have valid public liability insurance?		
14	Does the facility have a valid Escrow account?		
15	Does the facility have a valid Fire license?		
16	Is the facility currently in compliance with all regulations?		
17	Does the facility regularly submit monitoring report, compliance report and statutory returns to the regulatory agency?		
18	Does the facility regularly carry out environmental monitoring as per regulatory requirement?		
19	Does the facility regularly submit environmental monitoring report to the regulatory agency?		
20	Does the facility regularly submit compliance report of operation to the regulatory agency?		
21	Does the facility regularly submit statutory returns to the regulatory agency?		
22	Is the facility currently under notice from the regulatory agency for any non-compliance?		
23	Has the facility received any fines or penalties in the past?		
24	How often is the facility inspected by the regulatory agency?		
25	Has company interacted with the regulatory agency that monitors the facility?		
26	Does the facility have adequate firefighting installations?		
27	Does the facility have all trained personnel to handle and manage hazardous waste?		
28	Does the facility have an on-site an emergency response and preparedness plan?		

29	Does the facility have an off-site emergency management plan integrated with the local authorities' disaster management plan?		
30	Has company checked the reputation of the facility from other local companies, who are using the service of the facility?		
31	Does the facility have any history of soil or groundwater contamination from pollution at the site?		
32	Is the facility financially stable?		
33	Does the facility have liabilities associated with processing wastes off-site?		
34	Is a hazardous waste sample analysis required? If so, what fee is associated with the analysis? If the hazardous waste sample had been analysed by company through any outside laboratory, is that analysis report acceptable to the facility?		

Selection of Authorized Off-Site Facility and Off-site Waste Transportation, Treatment and Disposal

Whenever an off-site facility for waste treatment and disposal must be used:

1. Ensure that the off-site transportation of waste or transboundary and transnational movement of waste (if any) either own generated waste or waste sourced for co-processing in cement kilns meets the requirements of applicable regulations and Basel Convention and strive to follow internationally recognized standards.
2. Ensure in advance that any such facility or service to be used for is authorized and competent to undertake the task.
3. Ensure these facilities are designed and operated to meet the regulatory requirements and international standards of health, safety and environmental protection such as those required by the IFC (Performance Standards and EHS/Sector Guidelines).
4. Ensure that waste management contractors (including transport and disposal contractors) are assessed and evaluated as part of the procurement process prior to approval and meet the requirements.
5. Track the waste from the point of leaving a company site to its final disposal point through a waste tracking system designed as per the applicable legal regulation. Records of waste tracking system shall be maintained. The vehicles transporting hazardous wastes shall be equipped with the GPS vehicle tracking system.
6. Periodic audits of the waste management process, including the transportation, treatment and disposal of waste shall be undertaken to ensure that an off-site facility has been providing service in accordance with the agreed contract and performance expectations and meeting the regulatory requirements. The frequency of audits shall be based upon the risks associated with the types and quantities of wastes being transported, treated and disposed of. Audits shall be conducted prior to new facilities being used or new service within the existing off-site facility being used. As a minimum, off-site facility audit shall be conducted annually in case of regular service. Records of such audits shall be maintained.
7. If the lack of an approved and acceptable waste recovery facility or waste treatment or disposal facility necessitates the export of a particular type of waste, this shall be undertaken in compliance with local and regional regulatory requirements and the Basel Convention. An approved procedure for export of waste for treatment shall be developed and implemented.

Emergency Preparedness and Response

Potential emergency situations due to onsite collection, transport, storage, treatment and disposal of hazardous wastes and voluminous non- hazardous wastes shall include in the site Emergency Management Plan an Emergency Preparedness and Response Plan.

The Plan shall include detailed communication arrangements with stakeholders for responding to potential incidents involving on-site waste storage facilities, off-site waste transportation or captive facility operation.

Utilization of HW under Rule-9

Rule 9 SOP's applicable to Chlor Alkali industry should be referred (available on CPCB website) for Utilization of HW for which SOP is already available. Otherwise, study for HW utilization trials should be done following the procedure specified by CPCB (https://cpcb.nic.in/uploads/hwmd/SOP_December_2021.pdf).

All customers / consumers of HW should obtain permission under Rule 9. CPCB / SPCB may not allow to sell this hazardous waste if customer does not have permission under Rule 9 from 1st April 2023. For example, Bleach Liquor and Residues/Sludge from HSBP Plant.

Examples of SOP available (not complete, to be checked from time to time) are:

Sr. no.	SOP title	SOP released on	Type of Haz. Waste with cat. As Haz. Waste Rules, 2016	Source of Generation	Can be utilized at
1.	Utilization of Spent Sulphuric Acid [generated from pharmaceutical sector and Chlor-Alkali Plant] in manufacturing of Precipitated Silica, Colloidal silica and Silica gel	Dec. 22	Spent sulphuric acid (Sch II B 15)	Pharmaceutical sector and Chlor-Alkali Plant	Production of Precipitated Silica, Colloidal silica and Silica gel
2.	Utilization of Spent Sulphuric acid (generated from Dye & Dye Intermediates & Organic Chemical Industries) in manufacturing of Ferrous/ Copper/ Zinc Sulphate	Dec. 22	Spent sulphuric acid (Sch I 26.3, Sch II B 15 & C2)	Dye & Dye Intermediates, Organic Chemical Industries	Ferrous/ Copper/ Zinc Sulphate
3.	Utilization of Spent Calcium Hypochlorite (generated during manufacturing of High Strength Bleach Powder) as neutralizing agent in ETP	Feb. 2022	Spent Calcium Hypochlorite (Class - B of Schedule - II)	Generated during manufacturing of High Strength Bleach Powder (HSBP)	Used as neutralizing agent in ETP of inorganic chemical manufacturing industries.
4.	Utilization of Used Oil and Off Specification Products	Dec. 21	Used Oil and Off Specification Products	Off Specification Products generated during manufacturing of	Car & floor washing solution, Tyre polishing, Tent houses to wash

Sr. no.	SOP title	SOP released on	Type of Haz. Waste with cat. As Haz. Waste Rules, 2016	Source of Generation	Can be utilized at
	(Shampoo, Detergent & Creams) for Recycling		(Shampoo, Detergent & Creams) (Schedule I Category 5.1 and 28.4)	health care product and used oil from service station/ other industries etc.	their tent cloths & carpets respectively. Used oil recycled and send to Tyre manufacturers and Bitumen companies
5.	Utilization of Aluminium dross & its residues for recovery of Aluminium metal and manufacturing of Aluminium oxide briquette	Dec. 21	<ul style="list-style-type: none"> Aluminium dross (Cat. 11.5 of Sch.1) Aluminium dross residue, Cat. 11.5 of Sch I) 	<ul style="list-style-type: none"> Primary Aluminium smelting process Generated from separation of metal from Aluminium dross 	<ul style="list-style-type: none"> Recovery of Aluminium metal Manufacturing of Aluminium oxide briquette (Utilized in steel manufacturing)
6.	Utilization of spent hydrochloric acid (generated during manufacturing of Trichloroethylene/ Perchloroethylene/ chlorinated paraffin wax) for mfg. of 7ADCA	June 2021	Spent hydrochloric acid (Sch II B15)	Generated during manufacturing of Trichloroethylene/ Perchloroethylene/ chlorinated paraffin wax	Mfg. of 7ADCA
7.	Utilization of spent hydrochloric acid (generated during manufacturing of chlorinated paraffin wax) for mfg. of CaCl ₂	June 2021	Spent hydrochloric acid (Sch II B15)	Generated during manufacturing of chlorinated paraffin wax	Mfg. of CaCl ₂
8.	Utilization of Brine Sludge (generated from Caustic soda unit) for manufacturing of bricks	Feb. 2021	Brine sludge (Cat. 16.3 Sch I)	Caustic soda mfg. plant	For manufacturing of bricks
9.	Utilization of Aluminium dross residues generated from separation of metal from Aluminium dross or Aluminium dross reprocessing units for manufacturing of Alum	July 2019	Aluminium dross residues (Cat. A12/ A72 Sch II)	Generated from separation of metal from Aluminium dross/ aluminium dross reprocessing units	As a supplementary resource for mfg. of alum

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

CPCB has issued "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Waste and Penalty" (https://cpcb.nic.in/uploads/hwmd/Guidelines_Environmental_Damages_Costs_200116.pdf)

Compliance Requirements under EPR of Plastic Waste Management Rules, 2016

As Chlor Alkali units use different types of plastic packaging, PWM Rules and EPR under the same rules require different types of compliance and obligations from units.

- (1) Brand Owner Registration/Renewal and Compliance submissions: Unit-wise Plastic Packaging Procurement details and state wise Sale of Products (along with Plastic Packaging for getting target of EPR: along with required data formats and annual report Target date: 30th June every year
- (2) Procurement of EPR Credits for each types/Category of plastic from EPR Partner
- (3) Brand Owner Annual Return Filing on CPCB EPR portal (Example: for 2023-24 by 30 June 2024)
- (4) Units to purchase all plastic packaging from Registered Producers under PWMR
- (5) Minimum level of recycling (excluding end of life disposal) of plastic packaging waste (% of EPR Target) :

From Year 2024-25, fixed the percentage of recycling through EOL, need to adhere for EPR credit procurements from EOL, % is fixed as below ensured by EPR credit Procurement from EPR Partner

Plastic packaging category	2024-25	2025-26	2026-27	2027-28 and onwards
Category I	50	60	70	80
Category II	30	40	50	60
Category III	30	40	50	60
Category IV	50	60	70	80

- (6) EPR Target for 2024-25: Brand Owner registration -EPR obligation target is 100% for 23-24 and next years as per the below table reference to PWM Rules(reference to data submission for last 2 Years and calculated through CPCB EPR portal for target EPR obligation.

Year	EPR target
2021 – 22	25 %
2022 – 23	70 %
2023 – 24	100 %

- (7) Obligation for minimum level for Reuse for Category I (rigid plastic packaging)

The Brand Owner using Category I (rigid) plastic packaging for their products shall have minimum obligation to reuse such packaging as given below: - Provided that the reuse of Category I rigid plastic packaging in food contact applications shall be subject to regulation of Food Safety and Standards Authority of India.

Minimum obligation to reuse for Category I (rigid plastic packaging) is as below

	Year	Target (as percentage of Category-I rigid plastic packaging in products sold annually)
A	Category I rigid plastic packaging with volume or weight equal or more than 0.9 litre or kg but less than 4.9 litres or kg, as the case may be	
I	2025 – 26	10
II	2026 – 27	15
III	2027-28	20
IV	2028-29 and onwards	25
B	Category I rigid plastic packaging with volume of weight equal or more than 4.9 litres or kg.	
I	2025 – 26	70
II	2026 – 27	75
III	2027-28	80
IV	2028-29 and onwards	85

(8) Obligation/ Mandatory use of recycled plastic content in plastic packaging (% of manufactured plastic for the year)

The Brand Owner shall ensure use of recycled plastic in plastic packaging, category-wise, as given below. Plastic Packaging currently purchased from Producers need to be complied with % of recycled content from 2025-26 onwards as per above table (Responsibility – Respective Unit)

Plastic packaging category	2025-26	2026-27	2027-28	2028-29 and onwards
Category I	30	40	50	60
Category II	10	10	20	20
Category III	5	5	10	10

(9) Importer Application submission: To be registered as Importer if imported raw materials/equipment have plastic packaging (details to be checked on applicability).