Standard Operating Procedure and Checklist of Minimal Requisite Facilities for utilization of hazardous waste under Rule 9 of the Hazardous and Other Wastes (Management and Transboundary movement) Rules, 2016

Utilization of Spent Hydrochloric acid (generated during manufacturing of Chlorinated Paraffin Wax) for manufacturing of Calcium Chloride

June, 2021

Central Pollution Control Board

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

Parivesh Bhawan, East Arjun Nagar,

Shahdara, Delhi – 110032

Procedure for grant of authorization by SPCBs/PCCs for utilization of Hazardous waste

1) While granting authorization for utilization of hazardous wastes, SPCBs/PCCs shall ensure that authorization is given only to those wastes for which SoPs for utilisation have been circulated by CPCB ensuring the following:
   a. The waste (intended for utilization) belongs to similar source of generation as specified in SoP.
   b. The utilization shall be similar to as described in SoP.
   c. End-use/ product produced from the waste shall be same as specified in SoP.
   d. Authorization shall be granted only after verification of details and minimum requisite facilities as given in SoP.
   e. Issuance of passbooks (similar to passbooks issued for recycling of used oil, waste oil, non-ferrous scraps, etc.) for maintaining records of receipt of hazardous waste for utilization.
2) After issuance of authorization, SPCB shall verify the compliance of checklist and SoP on quarterly basis for initial 2 years; followed by random checks during subsequent period for atleast once a year.
3) In-case of lack of requisite infrastructures with the SPCBs/PCCs, they may engage 3rd party institutions or laboratories having EPA, 1986/NABL/ISO17025 accreditation / recognition for monitoring and analysis of prescribed parameters in SoPs for verification purpose.
4) SPCBs shall provide half yearly updated list of units permitted under Rule 9 of Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 (HOWM Rules, 2016) to CPCB and also upload the same on SPCB website, periodically. Such updated list shall be sent to CPCB on half yearly basis i.e., by July and January respectively.
5) Authorization for utilisation shall not be given to the units located in the State/UT where there is no Common TSDF, unless the unit ensures authorised captive disposal of the hazardous waste (generated during utilisation) or its complete utilisation or arrangement of sharing with any other authorised disposal facility.
6) In case of the utilization proposal is not similar with respect to source of generation or utilization process or end-use as outlined in this SoP, the same may be referred to CPCB for clarification /conducting trial utilization studies and developing SoPs thereof.
7) The source and work zone standards suggested in the SoP are based on the E(P)A notified and OSHA standard respectively, however, SPCB/PCC may impose more stringent standards based on the location or process specific conditions.

66.0 Utilization of Spent HCl:

Type of HW	Source of generation	Recovery/Product
Spent Hydrochloric acid Schedule-II Class B 15 Inorganic acids (of HOWM Rules, 2016)	Spent hydrochloric acid generated from manufacturing of Chlorinated Paraffin Wax	Manufacturing of calcium chloride

66.1 Source of Waste:

Spent Hydrochloric acid generated from manufacturing of Chlorinated Paraffin wax falls under Class B 15 (Inorganic acids) Schedule-II of HOWM Rules – 2016.

Table 1. Typical Characteristics of Spent HCl are given below:

Sr. No.	Parameter	Unit	Result
1	Color	-	Yellow
2	%HCl	%	30
3	TOC	%	ND
4	Chloride as Cl	mg/l	274671
5	Copper as Cu	mg/l	ND
6	Zinc as Zn	mg/l	ND
7	Iron as Fe	mg/l	ND
8	Nickel as Ni	mg/l	ND
9	Lead as Pb	mg/l	ND
10	Arsenic	mg/l	ND
11	Mercury	mg/l	ND
12	Cadmium	mg/l	ND
13	Chlorinated Paraffins	mg/l	ND

66.2 Utilization Process

Spent Hydrochloric Acid shall be used as supplementary resource in place of Virgin Hydrochloric Acid in the production of Calcium Chloride. Spent HCL is charged into the lime stone inside the digester. The HCL starts dissolving the limestone and calcium chloride brine is generated in lime stone digester. Lime stone digester will be followed by two stage Alkali scrubber.

The untreated brine is then decanted into a brick lined tank and a solution of hydrated lime is added to raise the pH. The untreated brine is then passed through a filter press where the acid insolubles (Filter cake) are separated, to get clear, neutral Calcium Chloride brine. The filter cake is bagged and stored in the Hazardous waste storage area and disposed to TSDF.

The treated brine is transferred to storage tank and then charged for evaporation. Eventually the product solidifies to yield hydrated form of the product. The product is packed or loaded into the dryer for further drying. After required drying the anhydrous form of the product is cooled and packed.

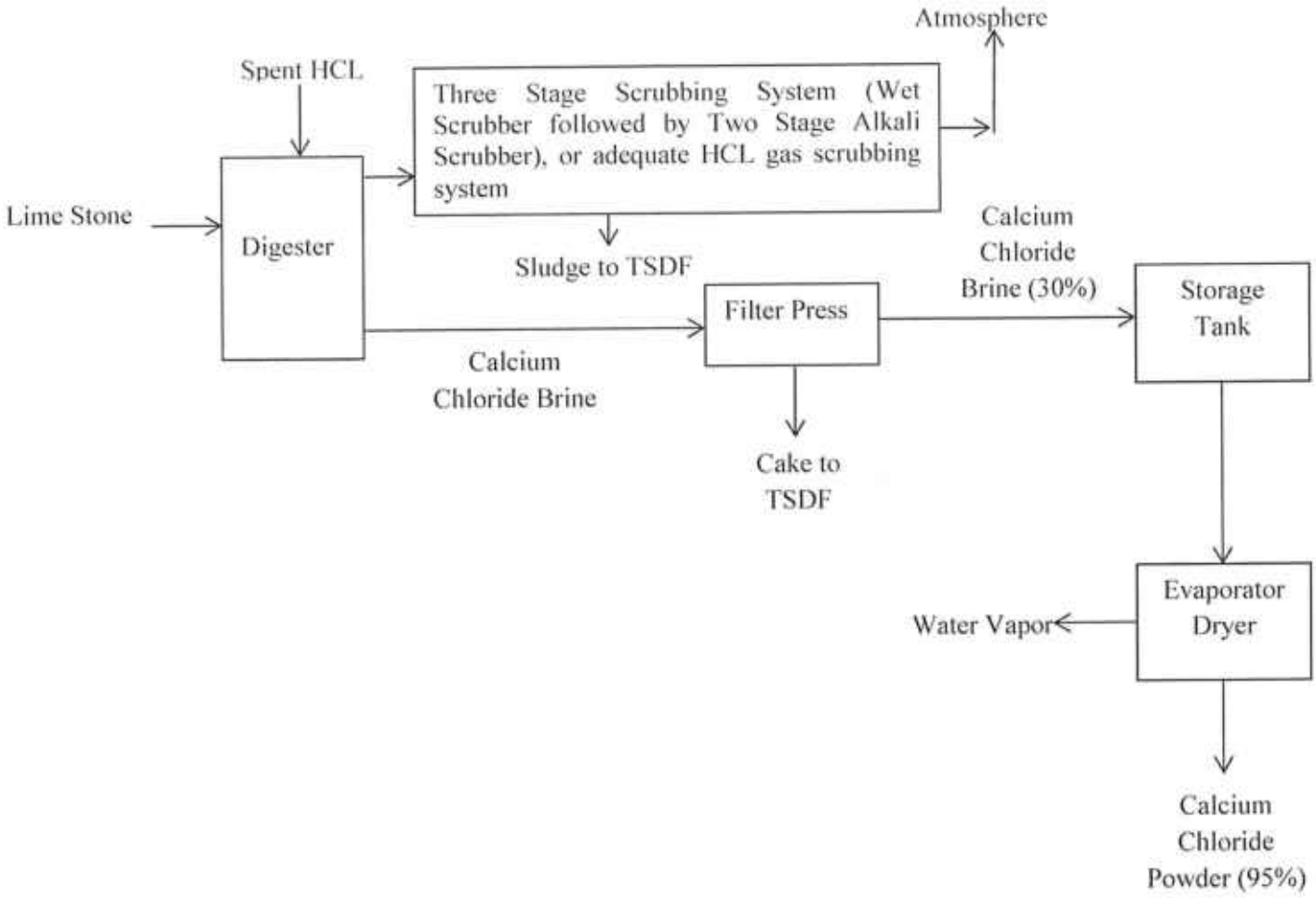

Figure: 1-*Process flow diagram for utilization of hazardous waste.*

66.3 Product Usage / Utilization

1. Use of Spent Hydrochloric acid will replace fresh virgin Hydrochloric acid consumption. Product ($CaCl_2$) manufactured by utilizing Spent HCl shall be utilized for Industrial grade only exempting food and pharma industries.
2. The Product i.e. Calcium Chloride ($CaCl_2$) shall comply as per Bureau of Indian Standards (BIS) – IS:1314-1984, for further respective utilization.
3. The unit shall label its product i.e. Calcium Chloride ($CaCl_2$) manufactured by utilizing aforesaid hazardous waste as "This Calcium Chloride ($CaCl_2$) has been manufactured by utilizing Spent HCl (generated during manufacturing of Chlorinated Parrafin Wax)".

66.4 Standard Operating Procedure for utilization

This SoP is applicable only for Utilization of Spent Hydrochloric acid (generated during Manufacturing Process of Chlorinated Paraffin Wax) is used as resource material for manufacturing of Calcium Chloride.

1) The Spent Hydrochloric acid shall be procured only in SPCB/PCC authorised barrels/closed tanks mounted over vehicles fitted with requisite safeguards ensuring no spillage of the same.

2) Spent Hydrochloric acid shall be stored in either HDPE or rubber lined steel tank and kept in acid proof brick lined dyke under shed. Unit shall provide slope and collection pit in storage area.
3) TOC of Spent HCl shall be less than 100 ppm, for utilization.
4) There shall be no manual handling of the Spent Hydrochloric acid. Spent Hydrochloric acid shall be unloaded from the closed tanker to the storage tank through pipelines using dedicated transfer pump. Spill containment arrangement shall be provided around the Spent Hydrochloric Acid storage tanks.
5) Also the feeding of Spent Hydrochloric acid from storage tanks to the utilization reactors shall be done through pipelines using dedicated transfer pump.
6) The storage and handling of Spent Hydrochloric acid shall be done under a shed of proper vertical height and over imperviously lined flooring.
7) The unit shall install storage tanks under cool, dry, well ventilated covered storage shed(s) within premises, as authorized by the concerned SPCB/PCC under Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
   Further, the storage area of Spent Hydrochloric acid shall have leak-proof floor tiles with adequate slope to collect spillage, if any, into a collection pit. The spillage from collection pit shall be transferred to ETP, as the cases may be, through chemical process pump.
8) The unit shall provide separate storage tanks for storage of chemicals and the storage tanks should be at designated place with proper cover and with acid brick lining floors.
9) Three Stage Scrubbing System (Wet Scrubber followed by Two Stage Alkali Scrubber), or adequate HCL gas scrubbing system shall be provided to the reactor (where Spent Hydrochloric acid is utilized) to treat the emissions from the reactor.
10) The treated gases shall comply with emission norms and prior to dispersion into atmosphere through stack. The height of stack shall be a minimum of 6 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher.
11) The unit shall maintain proper ventilation in the work zone and process areas. All personnel involved in the plant operation shall wear proper personal protective equipment (PPE) specific to the process operations involved and type of chemicals handled as per Material Safety Data Sheet (MSDS). The safety precautions of the worker shall be in accordance with the Factory Act, 1948, as amended from time to time.
12) Treatment and disposal of wastewater:
    Wastewater generated from floor-washings, spillages, reactor washing, scrubber bleed including the wastewater from filtration shall be treated Physico-Chemically in an ETP or may be sent to CETP for final disposal or be treated further in a captive facility to comply with surface water discharge standards.
    In case of zero discharge condition by SPCB/PCC, the treated waste water from ETP may be managed as per conditions stipulated by the SPCB/PCC.
13) The treated effluent shall be discharged in accordance with the conditions stipulated in the Consent to Operate issued by concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974.
14) The hazardous wastes generated (namely the Filter cake, other chemical sludge etc.) shall be collected and temporarily stored in non-reactive drums/ bags under a dedicated hazardous

waste storage area and be sent to authorized common TSDF or MEE or other authorized facility within 90 days from generation of the waste in accordance with the authorization issued by the concerned SPCB/PCC. Such storage area shall be covered with proper ventilation.

15) It shall be ensured that the Spent Hydrochloric Acid are procured from the industries, which have valid authorization from the concerned State Pollution Control Board as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
16) Transportation of Spent Hydrochloric Acid shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorisation from the concerned SPCB under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. Requisite manifest document shall be followed as laid down under the said Rules.
17) Prior to utilization of Spent Hydrochloric Acid, the unit shall obtain authorisation for generation, storage and utilization of Spent Hydrochloric Acid from the concerned State Pollution Control Board under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
18) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the occupier (sender or receiver, as the case may be) shall be liable to implement immediate response measures, environmental site assessment and remediation of contaminated soil/ groundwater/ sediment etc. as per the *"Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Wastes and Penalty"* published by CPCB.
19) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.
20) During the process of utilization and handling of hazardous waste the unit shall comply with requirement in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable. The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.

66.5 Record/Returns Filing

1) The unit shall maintain a passbook issued by concern SPCB wherein the following details of each procurement of Spent Hydrochloric acid shall be entered:
   - Address of the sender
   - Date of dispatch
   - Quantity procured
   - Seal and signature of the sender
   - Date of Receipt in the premises
2) A log book with information on source and date of procurement of Spent Hydrochloric acid, date wise utilization of the same, hazardous waste generation and its disposal, etc. shall be maintained including analysis report of fugitive emission monitoring & effluent discharged, as applicable.
3) The unit shall maintain record of hazardous waste utilised, hazardous waste generated and disposed as per Form 3 & shall file annual returns in Form 4 as per Rule 20 (1) and (2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, to concerned SPCB/PCC.
4) The unit shall submit quarterly and annual information on hazardous wastes consumed, its source, products generated or resources conserved (specifying the details like, type and

quantity of resources conserved) to the concerned SPCB.

66.6 Standards

1) Source emissions from the stack connected to reactors/process stack shall comply with the following Emission standards or as prescribed by the concerned SPCB/PCC, whichever is stringent;

Particulate Matter	50 mg/Nm^3
NOx	50 ppm
SOx	100 ppm
HCl Mist	20 ppm

2) Fugitive emission in the work zone area shall comply with the following standards:

PM_{10}	5 mg/m3 TWA* (PEL)
Cl_2	3 mg/ m3 TWA* (PEL)
HCl	7 mg/m3 Ceiling Limit
Chloro Benzene	350 mg/m3 TWA* (PEL)

**PEL - Permissible Exposure Limit*
**time-weighted average (TWA)- measured over a period of 8 hours of operation of process.*
A ceiling limit is one that may not be exceeded for any period of time, and is applied to irritants and other materials that have

3) Monitoring of the above specified parameters for source emission shall be carried out quarterly for first year followed by at least annually in the subsequent year of utilization. Fugitive emission for specified parameters shall be carried out quarterly. The monitoring shall be carried out by ISO 17025 accredited or EPA, 1986 approved laboratories and the results shall be submitted to the concerned SPCB/PCC on a quarterly basis.

4) Standard for wastewater discharge: Treated effluent shall be discharged in accordance with the conditions stipulated in Consent to Operate issued by concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974. In case of zero discharge or no discharge condition stipulated in the said consent or non-availability of the common Effluent Treatment Plant (CETP), zero discharge shall be met.

66.7 Siting of Industry

Facilities for utilization of Spent Hydrochloric Acid shall be preferably located in a notified industrial area or industrial park/estate/cluster and in accordance with Consent to Establish issued by the concerned SPCB/PCC.

66.8 Size of Plant and Efficiency of Utilisation

1414.79 Kg of Calcium Chloride (Powder Form) is produced by using 2850 Kg of Spent Hydrochloric Acid. Therefore requisite facilities of adequate size of storage shed and other plant & machineries shall be installed accordingly.

66.9 On-line Detectors / Alarms / Analyzers

In case of continuous process operations, online emission analyzers for PM, SO_2, NO_X in the stack shall be installed and the online data be connected to the server of the concerned SPCB/PCC.

66.10 Checklist of Minimal Requisite Facilities

Sl. No	Particulars
1.	Storage tanks of adequate capacity to store Spent Hydrochloric Acid. Such storage tanks shall be placed above the ground and contained with low rise parapet/bund wall and acid proof floor with slope to collect spillages, if any, in to collection pit. Alternately, the storage tanks may be below the ground provided it has HDPE liner system beneath the tank and leachate collection system below HDPE liner.
2.	Cool, dry well-ventilated covered sheds for Spent Hydrochloric Acid storage tanks, product storage tanks and process activities within premises and dedicated hazardous storage area for temporary storage of hazardous waste generated during utilization process.
3.	Mechanized system for transfer of Spent Hydrochloric Acid from storage tanks to Lime Digester shall be installed.
4.	The process units shall have suction hood. (The suction hood shall be connected with alkali scrubber and stack of adequate height)
5.	Spare vessel to transfer the reaction mass, if any, in case of leakage or damage to the Lime Digester.
6.	Pumps, pipes, feeders and other equipment for mechanical handling of Spent Hydrochloric Acid.
7.	Stack to have sampling port, platform, access to the platform etc. as per the guidelines on methodologies for source emission monitoring published by CPCB under Laboratory Analysis Techniques LATS/80/2013-14.
8.	Adequate HCl scrubbing system or Three Stage Scrubbing System (Wet Scrubber followed by Two Stage Alkali Scrubber), Lime Stone Digester (Closed), Dryer, Furnace, Storage Vessel, Waste Storage Vessel.
9.	Standby pumps with online pH sensor for scrubbing media with hooter
10.	Carbon filtration for $CaCl_2$
11.	Buffer tank for storage of CO_2 (foam) to prevent overflow

*****