

HARYANA STATE POLLUTION CONTROL BOARD
C-11, SECTOR-6, PANCHKULA
Ph-0172-577870-73, Fax No. 2581201
E-mail: hspcbhazardouswaste@gmail.com

HSPCB/YMN/2021/ Dated: 22/11/2021

To

1. All the Branch Incharges dealing with consent management.
2. All the Regional Officers.

Subject: Standard Operating Procedures for utilization of hazardous wastes under Rule 9 of the Hazardous and Other Wastes (Management and Transboundary Movement) (HOWM) Rules, 2016 –Reg..

Please find enclosed herewith a copy of letter No. 639 dated 31.08.2021 received from Central Pollution Control Board, Delhi regarding the new SoPs for utilization of hazardous waste for information and further necessary action.

DA/As above

Endst. HSPCB/YMN/2021/ Dated: 22/11/2021

A copy of the above is forwarded to Sr. Environmental Engineer, IT Cell, HSPCB for uploading the above said SoP for utilization of hazardous waste on the website of the Board.

DA/As above

Signed by Naveen Gulia
Date: 22-11-2021 16:26:54
Reason: Approved

**Sr. Environmental Engineer (HQ)
For HSPCB**

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 from glass manufacturing industry) for manufacturing of Calcium Chloride



August, 2021

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

Utilization of Spent Hydrochloric acid (generated from glass manufacturing industry) for manufacturing of Calcium Chloride

Procedure for grant of authorization by State Pollution Control Boards (SPCBs)/Polltion Control Committees (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 Standard Operating Procedures (SoPs) for utilisation have been circulated by Central Pollution Control Board (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, SPCBs/PCCs 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/PCCs 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/PCC 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/Union Territory 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 E(P)A notified and OSHA standard respectively, however, SPCBs/PCCs may impose more stringent standards based on the location or process specific conditions.

69.0 Utilization of Spent HCl:

Type of HW	Source of generation	Recovery/Product
Spent Hydrochloric acid Schedule II Class B15 Inorganic acids (of HOWM Rules, 2016)	Spent hydrochloric acid generated from scrubbing of HCl fumes generated in Glass manufacturing industry.	Manufacturing of Calcium Chloride

Utilization of Spent Hydrochloric acid (generated from glass manufacturing industry) for manufacturing of Calcium Chloride

69.1 Source of Waste:

Spent hydrochloric acid generated from wet scrubbing of HCl fumes generated in Glass manufacturing industry falls under category, Class B15 Inorganic acids Schedule II of HOWM Rules, 2016.

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

Sr. No.	Parameter	Unit	Result
1.	pH	-	1.12-1.16
2.	%HCl	%	18-20
3.	COD	mg/l	4000-4400
4.	Silica	mg/l	0.28-0.36
5.	Free Chlorine	mg/l	0.041-0.058
6.	Lead as Pb	mg/l	ND
7.	Arsenic as As	mg/l	ND
8.	Mercury as Hg	mg/l	ND

69.2 Utilization Process

The utilization process involves addition of calcium carbonate and spent hydrochloric acid (18-20%) in the reaction vessel, where calcium chloride is formed. The reacted mass is neutralized by addition of lime in the neutralization tank.

The clear solution of calcium chloride is decanted from the tanks and send through filter press for recovery of unreacted limestone. The solution is transferred to evaporators and crystallizer to obtained product. The finalized product is packed in bags after drying.

The chemical reaction involved in the utilization process is given below:



69.3 Product Usage / Utilization

1. The product Calcium Chloride (CaCl_2) manufactured by utilizing Spent Hydrochloric acid (HCl) shall be utilized for Industrial grade only exempting food and pharma industries.
2. The Product i.e. Calcium Chloride (CaCl_2) shall comply 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 Spent HCl as “*This Calcium Chloride (CaCl_2) has been manufactured by utilizing Spent HCl (generated from glass manufacturing industry)*”.

Utilization of Spent Hydrochloric acid (generated from glass manufacturing industry) for manufacturing of Calcium Chloride

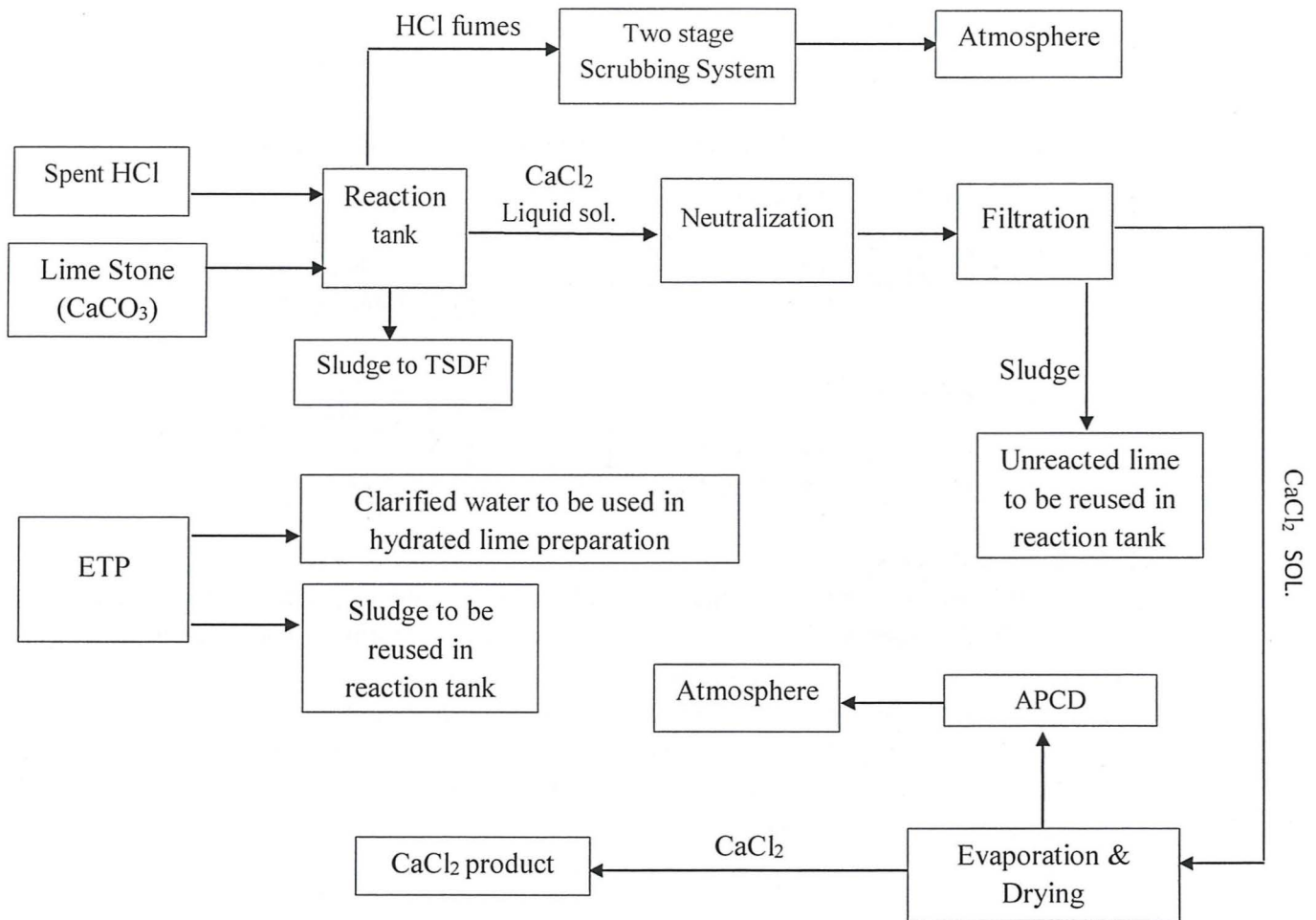


Figure: 1-Process flow diagram for utilization of hazardous waste.

69.4 Standard Operating Procedure for utilization

This SoP is applicable only for Utilization of Spent Hydrochloric acid (generated from glass manufacturing industry) to be used as resource material for manufacturing of Calcium Chloride.

- 1) The Spent Hydrochloric acid shall be procured only in SPCB/PCC authorized barrels/closed tanks mounted over vehicles fitted with requisite safeguards ensuring no spillage of the acid.
- 2) Spent HCl shall be stored in HDPE/FRP or rubber lined steel tank and kept in acid proof brick lined dyke under shed. The unit shall provide slope and collection pit in storage area. 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 HOWM Rules, 2016. Further, the storage area of Spent HCl 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.
- 3) The unit shall provide separate storage tanks/area at designated place with proper cover and acid brick lining floors for storage of Spent HCl, Calcium Chloride and Lime Stone.

Utilization of Spent Hydrochloric acid (generated from glass manufacturing industry) for manufacturing of Calcium Chloride

- 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. The feeding of Spent HCl shall be done through closed loop pipelines using dedicated transfer pump.
- 5) Two stage alkali scrubbing system shall be provided to the reactor (where Spent HCl acid is utilized) to treat the emissions liberated from the reactor. Also, the vent of Spent Hydrochloric Acid storage tanks shall be connected to the alkali scrubber.
- 6) The treated gases/fumes shall comply with emission norms prior to dispersion into atmosphere through stack. The stack height shall be minimum of 30m from ground level or as prescribed by the concerned SPCB/PCC, whichever is higher.
- 7) 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, the treated waste water from ETP may be managed as per conditions stipulated by the SPCB/PCC.
- 8) 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.
- 9) The hazardous wastes generated (namely the Filter cake, 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 other authorized facility within 90 days from its generation of the waste in accordance with the authorization issued by the concerned SPCB/PCC. Such storage area shall be covered with proper ventilation.
- 10) It shall be ensured that the Spent Hydrochloric Acid is procured from the industries, which have valid authorization from the concerned SPCB/PCC as required under HOWM Rules, 2016.
- 11) Transportation of Spent Hydrochloric Acid shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorization from the concerned SPCB/PCC under HOWM Rules, 2016. Requisite manifest document shall be followed as laid down under the said Rules.
- 12) Prior to utilization of Spent Hydrochloric Acid, the unit shall obtain authorization for storage, utilization and disposal of Spent Hydrochloric Acid from the concerned SPCB/PCC under HOWM Rules, 2016.
- 13) 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.
- 14) 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

Utilization of Spent Hydrochloric acid (generated from glass manufacturing industry) for manufacturing of Calcium Chloride

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.

- 15) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.
- 16) 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.

69.5 Record>Returns Filing

- 1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each procurement of spent acid as mentioned below:
 - 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 generated, utilized and disposed as per Form-3 & also file an annual return in Form-4 as per Rule 20 (1) and (2) of HOWM 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/PCC.

69.6 Standards

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

Particulate Matter	50 mg/Nm ³
NO _x	50 ppm
SO _x	100 ppm
HCl Mist	20 ppm
Chlorine	15 mg/Nm ³

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

PM ₁₀	5 mg/m ³ TWA* (PEL)
Cl ₂	3 mg/ m ³ TWA* (PEL)
HCl mist	7 mg/m ³ Ceiling Limit

Utilization of Spent Hydrochloric acid (generated from glass manufacturing industry) for manufacturing of Calcium Chloride

*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 immediate effects

- 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 consent or non-availability of the common Effluent Treatment Plant (CETP), zero discharge shall be met.

69.7 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.

69.8 Size of Plant and Efficiency of Utilisation

25 MT of Calcium Chloride (72%) is produced by utilizing 70 MT of Spent Hydrochloric Acid and 21 MT of lime stone. Therefore, requisite facilities of adequate size of storage shed and other plant & machineries shall be installed accordingly.

69.9 On-line Detectors / Alarms / Analyzers

In case of continuous process operations, online emission analyzers for PM, SO₂, NO_x and HCl mist in the stack shall be installed and the online data be connected to the server of the concerned SPCB/PCC.

69.10 Checklist of Minimal Requisite Facilities

Sl. No	Particulars
1.	Storage tanks of adequate capacity relevant as per section 69.8 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.

Utilization of Spent Hydrochloric acid (generated from glass manufacturing industry) for manufacturing of Calcium Chloride

3.	Mechanized system for transfer of Spent Hydrochloric Acid from storage tanks to Lime Digester.
4.	Spare vessel to transfer the reaction mass, if any, in case of leakage or damage to the reaction vessel.
5.	Pumps, pipes, feeders and equipment for mechanical handling of Spent Hydrochloric Acid.
6.	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.
7.	Reaction vessel, Brine Storage Vessel, Two stage alkali scrubbing system, Furnace and Dryer.
8.	pH sensor for scrubbing media with hooter



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 Resin & Glue waste as a Supplementary Fuel in Tile Manufacturing Industry



August, 2021

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

Utilization of Resin & Glue as a Supplementary Fuel in Tile Manufacturing Industry

Procedure for grant of authorization by State Pollution Control Boards (SPCBs)/Polltion Control Committees (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 Standard Operating Procedures (SoPs) for utilisation have been circulated by Central Pollution Control Board (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, SPCBs/PCCs 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/PCCs 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/PCC 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/Union Territory 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 E(P)A notified and OSHA standard respectively, however, SPCBs/PCCs may impose more stringent standards based on the location or process specific conditions.

70.0 Utilization of Resin & Glue waste:

Type of HW	Source of generation	Recovery/Product
Resin & Glue waste, Category 23.1, Schedule I (of HOWM Rules, 2016)	Generated during manufacturing of Wind mill blades.	As a supplementary fuel (Energy recovery) along with coal in Chain stove of Ceramic tile manufacturing industry

Utilization of Resin & Glue as a Supplementary Fuel in Tile Manufacturing Industry

70.1 Source of Waste:

The Resin and Glue waste is generated during manufacturing of Wind Mill blades, falls under the Category 23.1, Schedule I of HOWM Rules, 2016.

Table 1. Typical Characteristics of Resin and Glue waste are given below:

Sr. No.	Parameter	Unit	Result
1.	Arsenic as As	mg/L	0.290
2.	Barium as Ba	mg/L	25.44
3.	Nickel as Ni	mg/L	0.401
4.	Zinc as Zn	mg/L	1.113
5.	Manganese as Mn	mg/L	8.7
6.	Cadmium as Cd	mg/L	BLQ (LOQ:0.1)
7.	Chromium as Cr	mg/L	BLQ (LOQ:0.1)
8.	Lead as Pb	mg/L	BLQ (LOQ:0.1)
9.	Mercury as Hg	mg/L	BLQ (LOQ:0.1)
10.	Copper as Cu	mg/L	BLQ (LOQ:0.1)

70.2 Utilization Process

Resin and glue waste is utilized as supplementary fuel along with coal in the chain stove for hot air generation. This hot air is supplied to the spray dryer chamber through hot air distributor. The slip (wet slurry of the ground mix of raw materials i.e. clay, minerals etc.) is sprayed and dried in the spray dryer to make fine sieved particles/powder for the tile manufacturing.

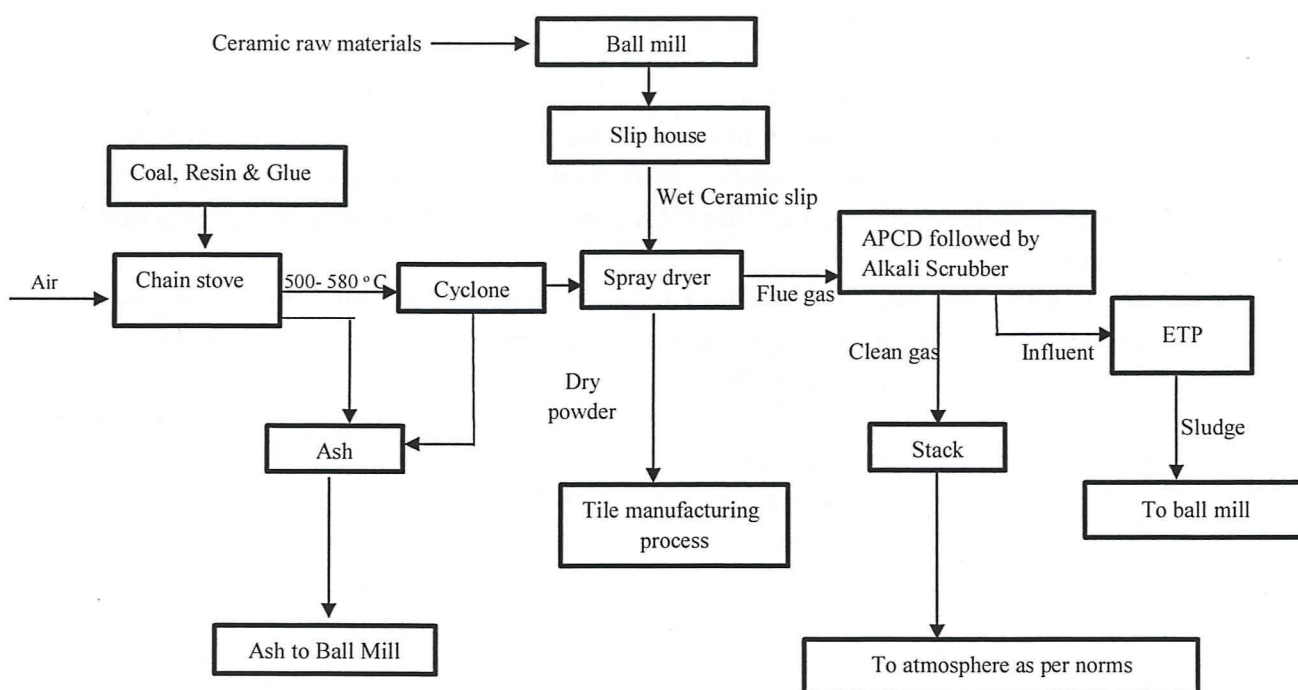


Figure: 1-Process flow diagram for utilization of hazardous waste.

70.3 Product Usage / Utilization

Resin and glue waste mixed with coal is used as a supplementary energy resource in Chain stove of Ceramic tile manufacturing industry which will conserve the natural resource i.e. coal.

70.4 Standard Operating Procedure for utilization

This SoP is applicable only for utilization of Resin & Glue waste (generated during manufacturing of Wind mill blades) as a supplementary fuel along with coal in Chain stove of Ceramic tile manufacturing industry.

- 1) The unit shall ensure the removal of plastics (PVC / polythene) from the Resin & Glue waste through proper dismantling and segregation and plastics contents shall not exceed 5 % of the Resin & Glue waste.
- 2) The unit shall not use Fibre Reinforced Plastics (FRPs) that are generated along with Resin & Glue waste as hazardous waste from Wind mill blades manufacturing industry.
- 3) Utilisation of Resin & Glue waste shall not exceed 15 % of the fuel consumption in Chain stove. The fuel shall be uniformly mixed in the ratio of 85:15 (Coal: Resin & Glue waste) by using appropriate mechanized mixing units and transferred to the Chain stove through mechanized system.
- 4) Resin & Glue waste shall be allowed to utilized with only coal as a supplementary fuel for energy recovery.
- 5) The unit shall ensure Resin & Glue waste to be crushed and sized down to less than 50 mm before utilization.
- 6) The unit shall ensure minimum temperature of 900 °C in chain stove after which Resin & Glue waste can be utilized. There must be provision for minimum automation in the process such as temperature sensor with chain stove.
- 7) Utilization of Resin & Glue waste shall not be carried out during un-stable/breakdown conditions in the Chain stove units.
- 8) The unit shall ensure excess Air to fuel ratio for proper combustion of the materials.
- 9) The gases from spray dryer chamber shall pass through Air Pollution Control Device like Electro static precipitators/ Bag filters/ Cyclone and further followed by Alkali scrubbing system.
- 10) The treated gases shall comply with emission norms prior to dispersion into atmosphere through stack. The stack height shall be minimum of 30m from ground level or as prescribed by the concerned SPCB/PCC, whichever is higher.
- 11) The unit shall ensure control of fugitive emissions through dust extraction system near Coal crushing and Spray dryer area.
- 12) The unit shall carryout intermittent water sprinkling in the working area (especially coal, raw material handling and spray dryer sections etc.) to avoid fugitives and dust emissions.
- 13) Treatment and disposal of wastewater:
Wastewater generated from floor-washings, spillages, reactor washing, scrubber bleed shall be treated Physico-Chemically in an Effluent Treatment Plant (ETP) or may be sent to Common Effluent Treatment Plant (CETP) for final disposal or be treated further in a captive facility to comply with surface water discharge standards.
In case of zero discharge, the treated waste water from ETP may be managed as per conditions stipulated by the concerned SPCB/PCC.

Utilization of Resin & Glue as a Supplementary Fuel in Tile Manufacturing Industry

- 14) 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.
- 15) The unit shall install storage area under cool, dry, well ventilated covered storage shed(s) within premises, as authorized by the concerned SPCB/PCC under HOWM Rules, 2016. Resin & Glue waste generated from manufacturing of Wind Mill blades shall be collected and stored under covered storage shed(s) with impervious floor within premises, so as to eliminate rain water intrusion.
Further, the storage sheds shall have proper slope and seepage collection pit so as to collect seepage/floor washings. The collected seepage/floor washings shall be channelized to ETP for treatment.
- 16) 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.
- 17) The wastes generated during utilization of Resin & Glue waste (namely ash, APCD dust, ETP sludge etc.) during manufacturing process of unit shall be captively utilized within the process as mentioned in figure-1 or collected and temporarily stored in non-reactive drums/ bags under a dedicated hazardous waste storage area and be sent to authorized common TSDF or other authorized facility within 90 days from generation of the waste in accordance with the authorization issued by the concerned SPCB/PCC.
- 18) The unit shall ensure that the Resin & Glue waste procured from the industries, which have valid authorization from the concerned SPCB/PCC as required under HOWM Rules, 2016.
- 19) Transportation of Resin & Glue waste shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorization from the concerned SPCB/PCC under HOWM Rules, 2016. Requisite manifest document shall be followed as laid down under the said Rules.
- 20) Prior to utilization of Resin & Glue waste, the unit shall obtain authorization for storage, utilization and disposal of Resin & Glue waste from the concerned SPCB/PCC under HOWM Rules, 2016.
- 21) 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.
- 22) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.
- 23) 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.



Utilization of Resin & Glue as a Supplementary Fuel in Tile Manufacturing Industry

70.5 Record>Returns Filing

- 1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each procurement of Resin & Glue waste as mentioned below:
 - 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 Resin & Glue waste, 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 generated, utilized and disposed as per Form 3 & also file annual returns in Form 4 as per Rule 20 (1) and (2) of the HOWM 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/PCC.

70.6 Standards

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

Particulate Matter	150 mg/Nm ³
NO _x	400 mg/Nm ³
SO ₂	200 mg/Nm ³
HCl Mist	50 mg/Nm ³
Total Dioxins and Furans	0.1 ngTEQ/Nm ³
Sb+As+Pb+Co+Cr+Cu+ Mn+Ni+V+their compounds	0.50 mg/Nm ³

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

PM ₁₀	5 mg/m ³ TWA* (PEL)
NO ₂	9 mg/m ³ Ceiling limit
SO ₂	13 mg/m ³ TWA* (PEL)
HCl mist	7 mg/m ³ Ceiling Limit
Arsenic as As	0.5 mg/m ³ TWA* (PEL)
Chromium as Cr	1 mg/m ³ TWA* (PEL)
Copper as Cu	1 mg/m ³ TWA* (PEL)
Lead as Pb	1 mg/m ³ TWA* (PEL)
Manganese as Mn	5 mg/m ³ Ceiling Limit
Nickel as Ni	1 mg/m ³ 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 immediate effects.

Utilization of Resin & Glue as a Supplementary Fuel in Tile Manufacturing Industry

- 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 CETP, zero discharge shall be met.

70.7 Siting of Industry

Facilities for utilization of Resin & Glue waste 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.

70.8 Size of Plant and Efficiency of Utilisation

This SoP is applicable for utilization of coal and Resin & Glue waste in the ratio of 85:15 for energy recovery. Therefore, requisite facilities of adequate size of storage shed and other plant & machineries shall be installed accordingly.

70.9 On-line Detectors / Alarms / Analyzers

In case of continuous process operations, online emission analyzers for PM, SO₂, NO_x in the stack shall be installed and the online data be connected to the server of the concerned SPCB/PCC.

70.10 Checklist of Minimal Requisite Facilities

Sl. No	Particulars
1.	Cool, dry well-ventilated covered sheds for Resin & Glue waste and process activities within premises and dedicated hazardous storage area for temporary storage of hazardous waste generated during utilization process.
2.	Mechanized systems for handling & transfer of coal and Resin & Glue waste.
3.	Chain stove, feeders, cyclone and ETP
4.	APCD like Electro static precipitators/ Bag filters/ Cyclone followed by Alkali scrubber
5.	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.
6.	Online analyzers for PM, SO ₂ & NO _x emission monitoring in the stack, in case of continuous process operations.

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 acid containing HCl
(generated as waste pickling liquor from Steel Industries)
for Regeneration of HCl and production of Ferric Oxide**



August, 2021

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

Utilization of Spent acid containing HCl (generated as waste pickling liquor from Steel Industries) for Regeneration of HCl and production of Ferric Oxide

Procedure for grant of authorization by State Pollution Control Boards (SPCBs)/Pollution Control Committee (PCCs) for utilization of Hazardous waste

- 1) While granting authorization for utilization of hazardous wastes, shall SPCBs/PCCs ensure that authorization is given only to those wastes for which Standard Operating Procedures (SoPs) for utilisation have been circulated by Central Pollution Control Board (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, SPCBs/PCCs 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/ISO 17025 accreditation / recognition for monitoring and analysis of prescribed parameters in SoP for verification purpose.
- 4) SPCBs/PCCs 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/PCC 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 E(P)A notified and OSHA standard respectively, however, SPCBs/PCCs may impose more stringent standards based on the location or process specific conditions.

71.0 Utilization of Spent Acid containing HCl:

Type of HW	Source of generation	Recovery/Product
Spent acid containing HCL (Waste Pickling Liquor- Category 13.1 of Schedule-I of HOWM Rules, 2016)	Pickling line of steel industries	Regeneration of HCl acid and production of Ferric Oxide

Utilization of Spent acid containing HCl (generated as waste pickling liquor from Steel Industries) for Regeneration of HCl and production of Ferric Oxide

71.1 Source of Waste:

Steel sheets are passed through Hydrochloric acid to remove surface impurities in pickling industries. The waste generated during this process is called spent acid or Waste Pickle Liquor (WPL) containing Ferrous Chloride. This spent acid containing HCL generated from Pickling line of steel industries falls under Category 13.1 of Schedule-I of HOWM Rules – 2016.

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

Sr. No.	Parameter	Unit	Range
1	Specific Gravity	-	1.10-1.25
2	HCl Acid content	%	2-10
3	Iron (Fe) content	g/L	60-130

71.2 Utilization Process

Hydrochloric acid regeneration is done by a chemical process (Pyrohydrolysis) for the recovery of bonded and un-bonded HCl from ferrous chloride solutions.

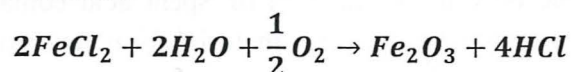
a. Venturi/Separator: HCl acid concentrator

Spent acid (WPL) is pumped from storage tanks to the Venturi. In Venturi direct mass and heat exchange with the roaster's exit hot gas takes place. The hydrogen chloride hot gas from roaster is cooled down from 400°C to 90°C-95°C approximately. Approximately 25-30% of water gets evaporated from the Spent acid and the concentration increases during the mixing of hot gas with liquid. The liquid/gas mixtures separate out in separator (part of venturi) leaves and goes to absorber.

b. Roaster: Spent Acid processing

Concentrated spent acid from the venturi is injected into the roaster at pressure more than 10 kg/cm² by means of spray booms with spraying nozzles. The roaster is fired by tangentially mounted burners that create a hot swirl. Temperatures inside the roaster vary between 550°C - 650°C (burner level) and 400°C (roaster gas exit duct). In the roaster the droplets of concentrated spent acid comes in contact with hot combustion product & reacts with oxygen, water to form Iron oxide powder and Hydrogen Chloride gas.

Chemical reaction inside roaster:



The Iron Oxide falls to the bottom of the roaster and hydrogen chloride fumes rises up and fed to Venturi (Gas temperature around 400°C). **Iron oxide powder** formed is removed from the roaster bottom & transported to bin for storage in leak-proof bags.

c. Absorber: Regeneration of HCl

The HCL containing gas from venturi separator is absorbed adiabatically in water in a packed column tower. The gas pass through the packed column from bottom to top and predetermined water quantity is sprayed from the top as an absorbing agent. Most of the HCl fumes is dissolved in water. The concentration of HCl (typical strength: 18% wt/wt) in regenerated acid (RA) is achieved by controlling the spray water flow rate to the absorber. The concentrated HCl is collected at bottom of the absorption column and pumped to the storage tank.

Utilization of Spent acid containing HCl (generated as waste pickling liquor from Steel Industries) for Regeneration of HCl and production of Ferric Oxide

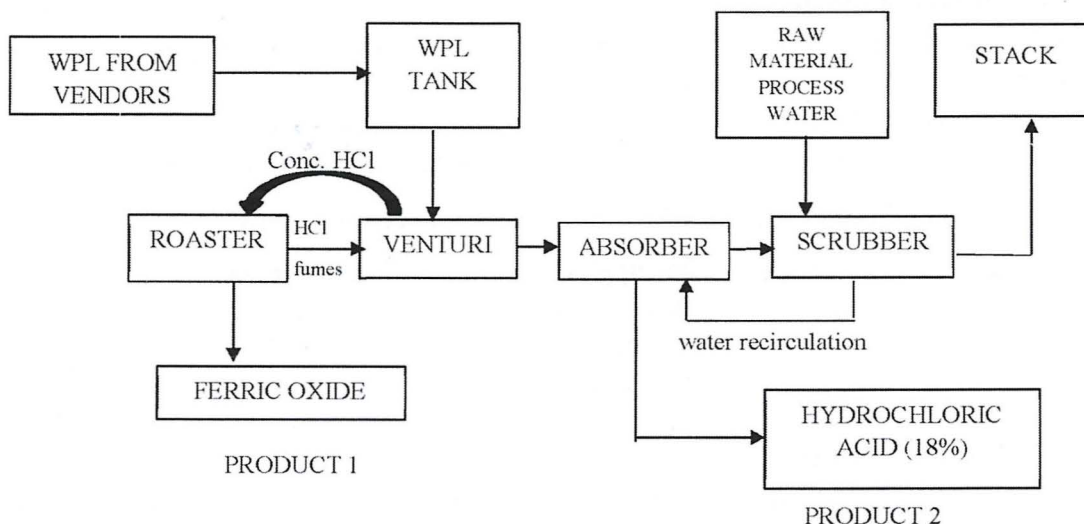


Figure: 1-Process flow diagram for utilization of spent acid containing HCl.

71.3 Product Usage / Utilization

1. Products manufactured by utilizing spent acid containing HCl shall be utilized for Industrial purposes only exempting food and pharma industries.
2. The regenerated acid (typical strength: 18%) is applicable for further re-use in Pickling Industries.
3. Ferric Oxide (Fe_2O_3) shall be used in Pigments making, Paint Industries, Tiles Industries, Cement Industries and making of soft ferrites for magnets, electronics etc.
4. The unit shall label tankers and bags carrying its products i.e. Regenerated Acid (HCl 18%) and Ferric Oxide manufactured by utilizing spent acid as *"This Regenerated Acid (HCl 18%) Ferric Oxide has been manufactured by utilizing Spent acid containing HCl (generated during pickling in steel industries)"*.

71.4 Standard Operating Procedure for utilization

This SoP is applicable only for Utilization of Spent acid containing HCl (generated from pickling line of steel industries) as resource material for regeneration of HCl and production of Ferric Oxide.

- 1) The spent acid shall be procured only in SPCB/PCC authorized closed tankers mounted over vehicles fitted with requisite safeguards ensuring no spillage of the acid.
- 2) Spent acid and regenerated HCl shall be stored in designated tanks either Fiber Reinforced Plastic (FRP) / steel tank and kept in acid proof brick lining floors with closed bund area by acid resistance brick wall.
Further, the storage area of spent 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 Effluent Treatment Plant (ETP), as the cases may be, through chemical process pump.
- 3) There shall be no manual handling of the spent acid at any stage of utilization process.

Utilization of Spent acid containing HCl (generated as waste pickling liquor from Steel Industries) for Regeneration of HCl and production of Ferric Oxide

- 4) Spent acid shall be unloaded from the closed tanker to the storage tank through pipelines using dedicated transfer pump.
- 5) Feeding of spent acid from storage tanks to process units i.e. roaster, venturi and absorber shall be done through closed loop pipelines using dedicated transfer pump.
- 6) The unit shall provide wet scrubber for the scrubbing out dust & HCl fumes from the possible gaseous output at roaster, venturi, separator, absorber before dispersion through stack to atmosphere.
- 7) The treated gases shall comply with emission norms prior to dispersion into atmosphere through stack. The stack height shall be a minimum of 30 m from ground level or as prescribed by the concerned SPCB/PCC, whichever is higher.
- 8) 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, the treated waste water from ETP may be managed as per conditions stipulated by the SPCB/PCC.
- 9) 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.
- 10) The hazardous wastes generated (if any) 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 other authorized facility within 90 days from generation of the waste in accordance with the authorization issued by the concerned SPCB/PCC.
- 11) The unit shall ensure that the spent acid is procured from the industries, which have valid authorization from the concerned SPCB/PCC as required under HOWM Rules, 2016.
- 12) Transportation of spent acid shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorization from the concerned SPCB/PCC under HOWM Rules, 2016. Requisite manifest document shall be followed as laid down under the said Rules.
- 13) Prior to utilization of spent acid, the unit shall obtain authorization for storage, utilization and disposal of spent acid from the concerned SPCB/PCC under HOWM Rules, 2016.
- 14) 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.
- 15) 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.

Utilization of Spent acid containing HCl (generated as waste pickling liquor from Steel Industries) for Regeneration of HCl and production of Ferric Oxide

- 16) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.
- 17) 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.

71.5 Record>Returns Filing

- 1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each procurement of spent acid as mentioned below:
 - 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 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 generated, utilized and disposed as per Form 3 & also file annual returns in Form 4 as per Rule 20 (1) and (2) of the HOWM 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.

71.6 Standards

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

Particulate Matter	150 mg/Nm ³
SO ₂	200 mg/Nm ³
HCl Mist	35 mg/Nm ³

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

PM ₁₀	5 mg/m ³ TWA* (PEL)
Cl ₂	3 mg/ m ³ TWA* (PEL)
HCl mist	7 mg/m ³ #
SO ₂	13 mg/m ³ TWA* (PEL)
NO _x	9 mg/m ³ #

*PEL - Permissible Exposure Limit; # - Ceiling 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 immediate effects.

Utilization of Spent acid containing HCl (generated as waste pickling liquor from Steel Industries) for Regeneration of HCl and production of Ferric Oxide

- 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.

71.7 Siting of Industry

Facilities for utilization of Spent 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.

71.8 Size of Plant and Efficiency of Utilisation

Typical spent acid comprises of 22% FeCl₂, 3.5% HCl and 74.5% of H₂O. Utilization of 100 Kg of spent acid may yield to generate 15.17Kg Fe₂O₃ and 16.2 Kg HCl. As complete recovery of spent acid takes place in the process, requisite facilities of adequate size of storage shed and other plant & machineries shall be installed accordingly.

71.9 On-line Detectors / Alarms / Analyzers

In case of continuous process operations, online emission analyzers for PM, SO₂, HCl mist in the stack shall be installed and the online data be connected to the server of the concerned SPCB/PCC and CPCB.

71.10 Checklist of Minimal Requisite Facilities

Sl. No	Particulars
1.	FRP/steel made Storage tanks of capacity relevant as per section 71.8 to store Spent acid as well Regenerated 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 product Ferric Oxide and dedicated storage area for temporary storage of wastes (if any) generated during utilization process.
3.	Mechanized system for transfer of Spent Acid from storage tanks to process vessels.
4.	Roaster, Scrubber and Absorber
5.	The process units shall be provided with appropriate suction connected with scrubber.
6.	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.
