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

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Central Pollution Control Board

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

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1.0 Introduction

There are provisions under Hazardous Waste Management Rules for utilization of various types of hazardous wastes. The Rule 11 of Hazardous Waste (Management, Handling and Transboundary Movement) Rules, 2008, stipulated that;

"The utilisation of hazardous wastes as a supplementary resource or for energy recovery, or after processing shall be carried out by the units only after obtaining approval from the Central Pollution Control Board."

In order to enforce the aforesaid provision, CPCB has evolved Standard Operating Procedure (SoP) for processing the proposals of utilizing hazardous wastes other than co-processing in cement kilns. This SoP has been circulated to all SPCBs/PCCs and also available at CPCB website (http://cpcb.nic.in/SOP_Rule_11_05102015.pdf).

CPCB has received about 67 different proposals for utilization of 48 types of hazardous wastes, of which CPCB has so far developed 18 Standard Operating Procedures (SoPs) and check-list of requisite facilities for utilization of 14 types of hazardous wastes. Conditional permissions have been given to the units for utilization of hazardous wastes for which successful trial runs were conducted by CPCB.

However, the procedure for utilisation of hazardous waste and other wastes has been modified in the recent notification - Hazardous and Other Wastes (Management and Transboundary movement) Rules, 2016. The Rule 9 of the said Rules lays down provision for the same and is reproduced below:

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

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

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

(3) No trial runs shall be required for co-processing of waste in cement plants for which guidelines by the Central Pollution Control Board are already available; however, the actual users shall ensure compliance to the standards notified under the Environment (Protection) Act,1986 (29 of 1986), for cement plant with respect to co-processing of waste, Provided that till the time the standards are notified, the procedure as applicable to other kind of utilisation of hazardous and other waste, as enumerated above shall be followed "

In compliance of the above and also decision taken in the 60th conference of Chairman and Member Secretaries held during 17th -18th May, 2016, this document has been prepared by CPCB so as to circulate the list of SoPs prepared so far to all the SPCBs/PCCs to enable them to grant authorisation for utilization of those hazardous waste for which SoPs has been prepared. Further, it has also been decided that CPCB may continue to circulate new SoPs prepared from time to time to all SPCBs/PCCs.

2.0 List of Standard Operating Procedures (SoPs)

This document provides SoPs for 18 utilization processes based on successful trial studies. These SoPS are applicable to utilization in industries other than co-processing in cement plants for which emission standards have already been notified (Annexure I). The list of SoPs prepared so far with details on the hazardous waste utilised, source of generation and product manufactured alongwith its intended use is given in Table 1 below:

Table 1: List of SoPs prepared by CPCB for utilization of Hazardous wastes

S. No	Name of HW	Source of generation	Type of utilization/Intended use
1	Spent Solvent – containing Toluene, Xylene, Cyclohexane, Acetone, Methyl isobutyl ketone, Methanol, Isopropyl alcohol, Methylene Dichloride, Tetra Hydro Furan, Ethyl Acetate, Iso Propyl Ether, Dimethyl formamide, Butyl acetate, Methyl Acetate, Butanol, Benzene, Ethanol and Methyl Ethyl Ketone	Industrial use of solvents, production/formulation of drugs/pharmaceuticals, Petrochemical process and pyrolytic operations.	Recovered solvents/mixed solvents for Industrial use
2	APCD Dust/ Residue	LD Furnace/Electric Arc Furnace (EAF)/Blast Furnace of Steel Plant/captive Blast Furnace and Ferro-Alloy Plant	As Briquettes for further use in blast furnace to produce pig iron.
3	Spent Catalyst containing precious metals and ETP Sludge containing platinum	Petrochemical process and pyrolytic operation, petroleum refining, production of acids, production of nitrogenous and complex fertilizers, production/formulation of drugs/pharmaceuticals and	Recovery of Precious metals - Platinum, Iridium, Osmium, Palladium, Rhodium, Ruthium, Rhenium, Gold & Silver

S. No	Name of HW	Source of generation	Type of utilization/Intended use
		ETP sludge	
4	Spent H2SO4	Pickling operations of MS rods / sheets	Ferrous Sulphate *(Not to be used in drinking water purification and to be used only for industrial purposes)*
5	Spent Acid - Containing Molybdenum	Filament and bulb Industry	Molybdenum Trioxide
6	Spent HCl	Metal surface cleaning in steel and rolling industry	Ferric Chloride *(Not to be used in drinking water purification or agriculture applications and to be used only for industrial purposes)*
7	Used Anode butt	Aluminum Smelter units	Carbon pellets and high energy coke for use in Steel furnaces/foundries
8	Used Anode butt	Aluminum Smelter units	Carbon blended coke/ electrode carbon paste/carburizer for use in Steel or Ferro Alloy furnaces
9	Used Anode butt (Pre-processed)	Aluminum Smelter units	Green anodes for use in Aluminum Smelters
10	Used Anode butt (Pre-processed)	Aluminum Smelter units	Carbon Electrode Paste for use in Ferro Alloy Plants
11	Coal Tar/Tarry Residue	Coal gasifier units	As supplementary fuel in furnace of sodium silicate units
12	Contaminated Container/ barrels/ drums	Pharmaceuticals, food processing, cosmetic, textile, paint formulation and beverages industries	Cleaned barrel and drums for industrial use and/or production of plastic granules.
13	Process and primary sludge of ETP – Pulp and Paper	Paper & Pulp Industry	Paper Board/ Mill Board / Card Board
14	Aluminium Dross	Refining and casting house of Aluminium smelter units	To recover aluminium metal (captive use)
15	Aluminium Dross	Refining and casting house of	To recover aluminium

S. No	Name of HW	Source of generation	Type of utilization/Intended use
		Aluminium smelter units	metal
16	Oil based iron sludge	Grinding mill section of Ball & Roller bearings	Ferrous Sulphate *(Not to be used in drinking water purification or agriculture applications and to be used only for industrial purposes)*
17	Spent catalyst - Containing Mercury and mercury waste	Various industry	Mercury
18	Spent H_2SO_4 containing organic compounds	Dye and Dye intermediates units	Chemical Gypsum for use in cement plants

3.0 Procedure for grant of authorisation by SPCBs/PCCs for utilization of Hazardous Waste

(i) While granting authorisation for utilization of hazardous wastes, SPCBs/PCCs shall ensure that authorisation is given only to those wastes for which SoPs on utilisation have been circulated by CPCB ensuring the following:

(a) The waste (intended for utilization) should have similar source of generation as specified in SoPs.

(b) The utilization process should be similar to the process of utilization described in SoPs

(c) End-use / product produced form the waste shall be same as specified in SoPs

(d) Authorisation shall be granted only after verification of minimum requisite facilities installed and after verification of utilization process as given in SoPs.

(e) Issuance of passbooks (similar to the passbooks issued for recycling of use oils, waste oil, non ferrous scraps, etc.) for maintaining records of receipt of hazardous wastes for utilization.

(ii) After issuance of authorization, SPCB shall verify the utilization process, checklist and SOPs, quarterly during the initial 2 years of operation followed by random checks in subsequent years.

Incase of lack of requisite infrastructures with the SPCBs/PCCs, SPCBs/PCCs may engage 3rd party institutions and EPA/NABL/ISO17025 accredited laboratories for

verification of SoPs. Such labs shall have accreditation (EPA/NABL/ISO17025) for the parameters specified in SoP.

(iii) SPCB shall provide half yearly up-dated list of units permitted for utilization of hazardous waste to CPCB and also periodically update the same on SPCB website Such updated list shall sent for January-June and July- December of every year and reach to CPCB by July and January respectively of every year.

(iv) Authorisation 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 or its complete utilisation or arrangement of sharing with any other authorised disposal facility.

(v) In case of the utilization proposal is not similar with respect to source of generation, utilization process and end-use as outlined in the SoP, the same may be referred to CPCB for clarification / conducting trial utilization studies and developing SoPs.

CPCB may continue to adopt the current procedure for processing of application for conducting trial utilization studies to evolve SoPs.

(vi) The source and work zone standards suggested in the SoPs are based on the E(P)A notified and OSHA standards respectively, however, SPCB may impose more stringent standards based on the location or process specific conditions

4.0 Standard Operating Procedure (SoPs) for specific utilisation processes

The SoPs outlined in this document have been developed after conducting trial studies based on a monitoring protocol prepared in consultation with experts/ seeking comments from public. The trial studies have been conducted by CPCB in association with SPCBs by engaging EPA/NABL/ISO17025 accredited laboratories. Few random samples, as applicable, were also collected by CPCB to ascertain the results with the third party labs. SoPs and checklists have been prepared only after examining the individual case for compliance with the monitored parameters as per trial run protocol and after evaluating requisite infrastructure for utilisation.

It is endeavour of CPCB to continuously improve upon the utilization process based on the technology improvements, implementation and experience gained on larger scale. Therefore, the conditions specified in SoPs or Check-list are subjected to change from time to time, which would be circulated to SPCBs/PCCs.

CPCB will be sending updated list of SoPs from time to time, by including new SoPs which may also cover modifications if any to the existing SoPs.

The SoPs for 18 utilization processes is given in following sections.

4.1 Utilization of Spent Solvent

This SoP is applicable only for recovery of solvent from the following spent solvents:

Type of HW	Source of generation	Recovery/Product
Spent Solvent	Pharma Industry	Recovered solvent or mixture of solvent containing; Xylene, Cyclohexane, Methyl Iso Butyl Ketone, Methanol, Iso Propyl Alcohol, Methylene Dichloride, Tetra Hydro Furan, Ethyl Acetate, Dimethyl formamide, Butyl acetate, Methyl Acetate, Butanol, Ethanol, Methyl Ethyl Ketone and Iso Propyl Ether
Spent Solvent	Industrial uses of solvents	Recovered solvent or mixture of solvent containing; Acetone, Toluene and Benzene

The recovery of solvent shall involve fractional distillation of spent solvent followed by single or two stages cooling in primary and secondary condenser, based on the boiling point of the spent solvent/residue.

Water shall be used as cooling medium for condenser for recovery of spent solvents having boiling point of 100^0C and above whereas for solvents with low boiling point (i.e. $<100^0$C), the unit shall provide secondary condenser with chilled water/brine as cooling medium.

A. Standard Operating Procedure

(1) Collection Storage & Handling of Spent Solvents

(a) In case of utilisation at a facility other than source of generation

- The Spent Solvents containing Toluene, Xylene, Cyclohexane, Acetone, Methyl isobutyl ketone, Methanol, Isopropyl alcohol, Methylene Dichloride, Tetra Hydro Furan, Ethyl Acetate, Iso Propyl Ether, Dimethyl formamide, Butyl acetate, Methyl Acetate, Butanol, Benzene, Ethanol and Methyl Ethyl Ketone shall be procured only in tankers/drums.

- The Spent Solvents shall be transferred from tankers/drums to the raw material storage tank and to distillation column by solvent transfer pump.

- Transportation of Spent solvents shall be carried out by sender or receiver (utilizer) after obtaining authorisation from the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

- It shall be ensured that the aforesaid hazardous waste is procured from the industries who have valid authorization for the same from the concerned State Pollution Control Board as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

- The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of spent solvents shall be entered:

    - Address of the sender

- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(b) In case of in-house Utilisation

- The spent solvent shall be stored in a dedicated storage tank with requisite safeguards ensuring no leakage and spillages.

(2) During loading and unloading of Spent Solvents/Recovered Solvent from Tanker to Storage Tank or Storage Tank to Tanker, vent (of both Storage Tank/Tanker) shall be connected to each other so as to minimize VOC emissions.

(3) Vent of all storage tanks (i.e. Spent Solvent and Recovered Solvent) shall be connected through condenser.

(4) All the Vehicles entering the premises shall be fitted with the spark arrestor.

(5) The vent of the condenser shall be 06 meters above the roof top.

(6) The vent of condenser shall be passed through VOC absorption media like activated carbon and shall comply with Process vent emission Standard of Total Organic Carbon (TOC) ≤: 20 ppm.

(7) During recovery of solvent from spent solvents, the unit shall comply with the following work zone standards:

OSHA Standards for Work Zone

S.No	Substance	CAS No.	TWA* PPM
1	Toluene	108-88-3	100
2	Xylenes (o-,m-,p- isomers) m-Xylene alpha,	1330-20-7	100
3	Cyclohexane	110-82-7	300
4	Acetone	67-64-1	1000
5	Methyl isobutyl ketone	108-10-1	100
6	Methanol	67-56-1	200
7	Isopropyl alcohol	67-63-0	400
8	Methylene Dichloride	75-09-2	25
9	Tetra Hydro Furan	109-99-9	200
10	Ethyl Acetate	141-78-6	400
11	Iso Propyl Ether	108-20-3	500
12	Dimethyl formamide	68-12-2	10
13	Butyl acetate	123-86-4	150
14	Methyl Acetate	79-20-9	200
15	Butanol	71-36-3	100
16	Benzene	71-43-2	1
17	Ethanol	64-17-5	1000
18	Methyl Ethyl Ketone	78-93-3	200

** time-weighted average (TWA),the PELs are 8-hour TWAs .*

(8) The work zone and source emission monitoring for parameters (as applicable) as stated above shall be carried out quarterly through NABL/EPA accredited laboratory and the results shall be submitted quarterly to the concerned SPCB.

(9) The unit shall install online continuous monitoring system for TOC at the condenser vent and connect the online emission data at SPCB and CPCB server.

(10) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(11) The unit shall provide laboratory facility for analysis of solvent.

(12) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.

(13) The unit shall obtain license from Petroleum and Explosive Safety Organization of Govt. of India.

(14) Residue generated from the distillation unit shall be packaged and temporarily stored in a dedicated hazardous waste storage area within the unit. The same shall be disposed in Common Hazardous Waste Treatment Storage Facility or sent to cement kilns for co-processed/utilized at facility as authorised by the concerned SPCB.

(15) The unit shall ensure that all the discarded/used drums/barrels are either sent back to the unit from where the Spent Solvent is procured or to the facility who has authorisation for utilization of used drums/barrels or to the Common Hazardous Waste Treatment Storage and Disposal facility (CHWTSDF) for disposal, as authorized by the SPCB/PCC.

(16) The effluent generated from cooling tower shall be discharged as per the conditions stipulated by the concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974.

(17) Transportation of the residues generated during the utilisation process shall be carried out by sender or receiver (TSDF operator) as per the authorization issued by the concerned SPCB as per the provisions under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(18) The unit shall submit quarterly and annual information on Spent Solvents consumed; its source, products generated or resources conserved (specifying the details like type and quantity of resources conserved.) to the concerned SPCB.

(19) A log book with information on source and date of procurement/generation of each type/category of Spent solvent, their boiling point, quantity, characteristics, date wise utilization, quantity of solvent recovered, hazardous waste generation, etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(20) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(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 unit 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) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Particulars
1.	Collection Storage & Handling of Spent Solvent
(a)	In case of utilisation at a facility other than source of generation
	- Tankers/HDPE drums shall be used for receiving spent solvents - Connection of vent of the tanker with Spent solvent storage tanks during loading. - Solvent transfer pump (s) for transferring Spent Solvent from tanker/ drums to raw material storage tank.
	OR
(b)	In case of in-house Utilisation
	- Spent solvent shall be stored in a separate tank/drums
2.	Solvent transfer pump (s) for transferring Spent Solvent from storage tank and to distillation column.
3.	Connection of vent of the tanker with Recovered solvent storage tanks during unloading.
4.	Vent of all the storage tanks (i.e. Spent solvent & recovered solvent) connected to condenser.
5.	Vehicles shall be fitted with the spark arrestor
6.	Thermic fluid heater/ electric heating system
7.	Distillation column
8.	Water as cooling medium for condenser for recovery of Spent solvent with boiling point of 100^0C and above
9.	Cooling Tower
10.	Secondary condenser with chilled water/brine as cooling medium for solvent with low boiling point (i.e. $<100^0$C).

11.	VOC absorption media connected to vent of condenser
12.	Packaging & storage of residue generated from distillation column in dedicated storage area
13.	Fire safety arrangements
14.	Installation of Online analyser for VOC at the vent outlet- in time bound manner

4. 2 Utilization of APCD Dust/ Residues (Steel Plants)

This SoP is applicable only for utilization of APCD Dust/Residues as described below:

Type of HW	Source of generation	Recovery/Product
APCD Dust/ Residue	Flue gas dust/gas cleaning plant (GCP) sludge of LD furnace/electric arc furnace (EAF)/blast furnace of steel plant/captive blast furnace; and GCP sludge of ferro alloy plants	For production of cold briquettes to be used in Blast Furnace for the production of Pig Iron.

The utilisation process involves agglomerating of flue gas dust/gas cleaning plant (GCP) sludge of LD furnace/electric arc furnace (EAF)/blast furnace of steel plant/captive blast furnace; and GCP sludge along with binders like cement/molasses/bentonite to prepare cold briquettes (without heating process). These cold briquettes will be further used in the blast furnace to produce Pig Iron.

A. Standard Operating Procedure

(1) The said Flue Gas Dust/Gas Cleaning Plant (GCP) Sludge of LD Furnace/Electric Arc Furnace (EAF)/ Blast Furnace of Steel plants and GCP sludge of Ferro-Alloy Plant shall be procured only in wet form having moisture not less than 15% by weight so as to avoid fugitive dust emission during handling/ loading/ transportation/ unloading/ mixing etc. The said wastes shall, however, be not procured in slurry form.

(2) The unit shall store the said wastes in covered storage shed(s) within premises, as authorised by the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, so as to eliminate rain water intrusion.

(3) While mixing to prepare agglomerate, it shall be ensured that no fugitive dust formation takes place by maintaining >15% moisture in the said wastes.

(4) Leachates/seepage, if any, generated from storage shed(s) shall be used in preparing agglomerate.

(5) Units of Briquetting plant such as Binder Feeder and Primary Blending Machine shall be operated in closed system maintaining suction and attached to bag filter house connected a stack of height as prescribed by the concerned SPCB.

(6) It shall be ensured that there is no manual handling of the said wastes while loading, unloading, mixing and briquetting. The process of agglomeration and briquetting shall be cold process without heating.

(7) The PM_{10} and Lead concentration in fugitive dust of the work zone area of the mixing and briquetting units shall not exceed 4000 $\mu g/m^3$ and 2$\mu g/m^3$. Monitoring in this regard shall be carried out quarterly and report be submitted to the concerned SPCB.

(8) The Particulate Matter emission standard for the stacks attached to Mini Blast Furnaces, as prescribed by the concerned State Pollution Control Board, in the Consent to Operate issued under the Air (Prevention and Control of Pollution) Act, 1981, shall be applicable during the utilization of aforesaid briquettes in Blast Furnace. Monitoring in this regard shall be carried out quarterly and report be submitted to the concerned SPCB.

(9) The blast furnace granulated slag shall be utilized in Cement manufacturing.

(10) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(11) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of flue gas dust/gas cleaning plant (GCP) sludge of LD furnace/electric arc furnace (EAF)/blast furnace of steel plant; and GCP sludge of ferro alloy plant shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(12) Transportation of the aforesaid wastes shall be carried out by sender or receiver (utilizer) after obtaining authorization from the concerned State Pollution Control Board/Pollution Committee as per the provisions under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, with requisite safeguards ensuring no pilferage of the wastes or leachates, if any.

(13) It shall be ensured that the aforesaid hazardous wastes is procured from the Steel Plants/ Ferro- Alloy Plants who have valid authorization for the same from the concerned State Pollution Control Board as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(14) 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.

(15) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(16) A log book with information on source and date of procurement of each type of the said hazardous wastes, quantity, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(17) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.

(18) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
1.	Storage shed(s) for storage of Flue Gas Dust/Gas Cleaning Plant (GCP) Sludge of LD Furnace/Electric Arc Furnace (EAF)/ Blast Furnace of Steel plants and GCP sludge of Ferro-Alloy Plant
2.	Storage shed(s) of (1) should be of such size/capacity that it can store at least two weeks requirement of the aforesaid waste
3.	Water sprinkling facility to wet the stored hazardous waste to control fugitive dust emission
4.	Adequate slope, periphery drainage in the Godown and mixing facilities followed by a leachate/seepage collection tank, which shall be connected to the water sprinkling system.
5.	JCB Excavator/Loader for mixing aforesaid wastes under shed
6.	Briquetting plant consisting of: (i) Ground hopper (ii) Vibro-screens (iii) Main Feeder (for primary minerals/said wastes) (iv) Binder feeder (v) Blending machines (primary and secondary) (vi) Briquetting machine; and (vii) Briquetting stacker
7.	Suction system attached to various operations of briquetting plant including Binder Feeder and Primary Blending Machine and connected to Bag filter house

	and stack of height as prescribed by the concerned SPCB
8.	Blast Furnace (in case of captive utilisation)
9.	Bag filter House connected to GCP of Blast Furnace (in case of captive utilisation)
10.	Stack (attached to Bag filter house of the Blast Furnace) of adequate height as prescribed by the concerned SPCB (in case of captive utilisation)

4. 3 Utilization of Spent Catalyst and Chemical Sludge containing precious metals

This SoP is applicable only for utilization of Spent Catalyst and Chemical Sludge containing precious metals as described below:

Type of HW	Source of generation	Recovery/Product
Spent catalyst	Petrochemical process and pyrolytic operation, petroleum refining, production of acids, production of nitrogenous and complex fertilizers and production/formulation of drugs/pharmaceuticals	Recovery of Platinum, Iridium, Osmium, Palladium, Rhodium, Ruthium, Rhenium, Gold & Silver to produce electrical contacts and non-ferrous strips
Chemical /ETP Sludge containing platinum	Effluent treatment plant	Platinum to produce electrical contacts and non-ferrous strips

The utilization process shall adopt hydrometallurgical processes involving, leaching, filtration and washing to obtain metal compound in solution form. Heat treatment in furnace, prior to hydrometallurgical processes, may be given to alumina/carbon/silica based catalysts as applicable. The metal from its compound form is recovered through replacement reaction.

The recovery of precious metals shall involve the following steps:

- In case of Carbon based spent catalyst, burning in the furnace at a temperature of 850°C, and leaching of the residue with HCl/ HNO_3 or aqua regia followed by filtration and residue washing to recover precious metals.
- In case of Spent alumina based catalyst, direct leaching as above followed by filtration and residue washing to recover precious metals. If carbon soot is present, burning in furnace followed by chemical leaching as above.

A. Standard Operating Procedure

(1) Minimum temperature of 850°C shall be maintained with residence time of about 02 seconds in the furnace in cases where Spent Catalyst/Spent Carbon is subjected to heat in furnace. The flue gases from furnace shall be treated in air pollution control devices so as to meet standards prescribed for PM by the concerned SPCB.

(2) The height of the stack attached to furnaces shall be 30 meters from ground or as prescribed by the concerned SPCB, whichever is higher.

(3) All the reaction vessels (where acids are used or expected to be liberated) shall be connected with hood over them to suck acid fumes/vapours. The hood shall be maintained under suction followed by treatment in scrubber using alkaline medium. The treated gases from scrubber shall be dispersed into atmosphere through stack by complying with emission norms for HCl, Acid mist and NOx.

(4) There shall be no manual handling of the hazardous wastes, acids, water, residues, chemicals etc. The same shall be handled mechanically and it shall be ensured that there is no spillage or pilferages around the process area. The transit material shall be kept or handled in acid-proof containers.

(5) The entire process area shall have leak-proof and acid proof tiles with adequate slope to collect spillages if any into collection pit.

(6) The waste water generated from the process shall be treated in Effluent Treatment Plant to meet standards and treated water be discharged or utilized as prescribed by the concerned SPCB under the Consent to Operate issued under the Water (Prevention and Control of Pollution) Act, 1974.

(7) The washed alumina after recovery of precious metals may be sent to refractory brick manufacturer. However, rest of the solid residues from process and ETP sludge shall be packaged and temporarily stored in a dedicated hazardous waste storage area within the unit premise and disposed in common hazardous waste treatment, storage and disposal facility within 90 days.

(8) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(9) The unit shall comply with following standards:

- *Stack emission standards for stacks attached to Furnace-*

  Particulate Matter - as stipulated by the concerned SPCB

- *Stack emission standards for stacks attached to Reaction Vessels-*

  Hydrochloric Acid Vapour & Mist - 35 mg/Nm^3
  Sulphuric Acid Mist - 50 mg/Nm^3
  Nitrogen Dioxide - 400 mg/Nm^3

- *Work Zone standards –*

  Sulphuric acid – 0.1 mg/m^3 TWA*, 3 mg/m^3 STEL*
  Hydrochloric acid- 7 mg/m^3 Ceiling limit
  Nitrogen Dioxide - 9 mg/m^3 Ceiling limit
  ** Time-weighted average (TWA), Short-term exposure limits (STEL).*
  The Permissible Exposure Limit is 8-hour TWA.

  A short-term exposure limit (STEL) is the acceptable average exposure over a short period of time, usually 15 minutes as long as the Time weighted average is not exceeded.
  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.

(10) Monitoring of the specified parameters for source and work zone emissions as well as aforesaid effluent shall be carried out by NABL/EPA accredited laboratories quarterly and the results shall be submitted to the concerned SPCB quarterly.

(11) Transportation of the Spent Catalyst/Chemical Sludge and residues generated from utilisation process shall be carried out by sender or receiver (utilizer/TSDF operator) after obtaining authorization from the concerned SPCB as per the provisions under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(12) It shall be ensured that the aforesaid hazardous wastes is procured from the industries who have valid authorization for the same from the concerned SPCB as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(13) 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 concerned SPCB.

(14) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of Spent Catalyst and Chemical Sludge shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(15) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(16) A log book with information on source and date of procurement of each type of the said hazardous wastes, quantity, date wise utilization of the same, quantity of other raw material used, quantity of products manufactured, hazardous waste generation

and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(17) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.

(18) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
1.	Storage shed for storage of Spent Catalyst and Chemical Sludge. The shed shall be covered so as to eliminate rain water intrusion. Cemented flooring or any other impervious flooring shall also be made under the storage shed.
2.	Size of the said storage shed to be adequate to store at least one week requirement of the said hazardous wastes to be used as raw material
3.	Furnaces of adequate capacity along with air pollution control devices like cyclone and alkali scrubber or other adequate system followed by stack of height 30 meters from ground level. Stack with easy access to port hole, for conducting stack monitoring
4.	Acid/aqua regia storage vessels
5.	Mechanical means for transferring of acids/liquid chemicals to the reaction vessels
6.	Jacketed Reactor Vessels (Lined with stainless steel or glass or suitable material)
7.	Centrifuge/filter press or other suitable equipment for filtration (to separate leached solution and solid residue), washing and dewatering
8.	The entire process area shall have leak-proof and acid proof tiles with adequate slope to collect spillages if any into collection pit.
9.	Boiler to supply heat to jacketed reactor vessel
10.	Reaction vessel to recover metal from its compound form
11.	Hood over all reaction vessels with proper acid proof ducting material maintaining suction and attached to scrubber and stack
12.	Effluent treatment plant to meet the prescribed treated water standards

13.	Properly covered hazardous waste storage area to store packaged process residues and ETP sludge. Size of the same shall be sufficient to store the said wastes for 90 days.

4. 4 Utilization of Spent Sulphuric Acid generated from pickling

This SoP is applicable only for utilization of Spent H_2SO_4 as described below:

Type of HW	Source of generation	Recovery/Product
Spent H2SO4	Pickling operations of MS rods / sheets	Ferrous Sulphate

The utilization process shall involve addition of iron scrap/powder to Spent H_2SO_4 (fresh sulphuric acid may be added, as per the requirement to maintain desired specific gravity) in a reaction tank followed by filtration of reacted liquor in a filter press to separate residues; the mother liquor is then crystallized. The product Ferrous Sulphate ($FeSO_4.7\ H_2O$) is separated from mother liquor in a centrifuge and dried.

A. Standard Operating Procedure

(1) The Spent acid containing H_2SO_4 shall be procured only in rubber lined tankers/HDPE drums.

(2) There should be designated space for unloading Spent H_2SO_4 into rubber lined storage tank.

(3) The receiving storage tank shall be placed above the ground and contained with low raise bund wall & acid proof floor with slope to collect spillages, if any to collection pit.

(4) There shall be no manual handling of the spent acid. Chemical process pump shall be used for transfer of spent acid to the process units.

(5) The entire process area shall have leak-proof and acid proof floor tiles with adequate slope to collect spillages, if any, into a collection pit.

(6) The spillages from collection pit shall be transferred to ETP or reaction tank, as the cases may be, through chemical process pump.

(7) The reaction vessel shall be connected with suction hood above the feeding point (of iron scrap) to control acid fume/vapour liberated from the reaction vessel. The suction hood shall be connected with alkali scrubber and stack.

(8) The treated acid fume/vapour shall comply with emission norms and shall be dispersed through stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB, whichever is higher.

(9) Sources of wastewater generation may be

a) Spent mother liquor after several cycles of recycling
b) Scrubber bleed
c) Floor washing/reactor wash/vehicle wash/spillages, etc.

The above wastewater shall be treated Physico-Chemically by neutralization, coagulation & sedimentation and the treated effluent shall be recycled so as to meet zero discharge conditions or applicable discharge standards, in case discharge has been permitted by the concerned SPCBs.

(10) The hazardous waste (viz. filter mud, residue from scrubber and ETP sludge) generated from utilization process shall be packaged in HDPE drums/bags and temporarily stored in a dedicated hazardous waste storage area within the unit premise and disposed in common hazardous waste treatment, storage and disposal facility within 90 days.

(11) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(12) The Ferrous Sulphate ($FeSO_4.7H_2O$) produced from utilizing aforesaid hazardous waste shall not be used in drinking water purification or agriculture applications and the same shall be used only for industrial purposes. The unit shall, therefore, label the product i.e. Ferrous Sulphate ($FeSO_4.7H_2O$) as *"not be utilized for drinking water purification or agriculture applications and to be used only for industrial purposes*".

(13) The unit shall comply with following standards:

- *Source Emission Standards-*

  Emission standard of Sulphuric Acid Mist in stack attached to Reaction tank may be stipulated as 30 mg/Nm^3.

- *Work Zone standards –*

  Sulphuric acid – 0.1 mg/m^3 TWA*, *3 mg/m3 STEL**

  * T*ime-weighted average (TWA), Short-term exposure limits (STEL). The Permissible Exposure Limit is 8-hour TWA.*

  A short-term exposure limit (STEL) is the acceptable average exposure over a short period of time, usually 15 minutes as long as the Time weighted average is not exceeded. 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.

(14) Monitoring of the specified parameters for source and work zone emissions shall be carried out by NABL/EPA accredited laboratories quarterly and the results shall be submitted to the concerned SPCB quarterly.

(15) Transportation of Spent H_2SO_4 and residues generated during utilisation process shall be carried out by sender or receiver (utilizer/TSDF operator) as per the authorisation issued by the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(16) It shall be ensured that the aforesaid hazardous waste is procured from the industries who have valid authorization for the same from the concerned SPCB as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(17) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of Spent H_2SO_4 shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(18) 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.

(19) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(20) A log book with information on source and date of procurement of the aforesaid hazardous waste, quantity, date wise utilization of the same, quantity of other raw material used, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(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 unit 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) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
1.	Spent H_2SO_4 Storage tank (s) with acid proof rubber lining having minimum storage capacity of at least one weeks consumption.
2.	The storage tank shall be placed above the ground and contained with low raise bund wall & acid proof floor with slope to collect spillages into collection pit.

3.	Chemical process pump to transfer Spent acid containing H_2SO_4 from tanker to storage tank and then to reaction tank
4.	The entire process area shall be made of leak-proof and acid proof floor tiles with adequate slope to collect spillages, into collection pit.
5.	Collection pit for collection of spillages from the working and unloading area.
6.	Adequate Storage facility for Sulphuric acid and Iron scrap/powder
7.	Reaction tank shall be connected with suction hood above the feeding point (of iron scrap). The suction hood shall be connected with alkali scrubber and stack.
8.	The height of stack shall be minimum of 06 m above the roof top or as prescribed by the concerned SPCB, whichever is higher. Stack shall have easy access to port hole for conducting stack monitoring
9.	Filter press
10.	Crystallizer unit (open tanks, jacketed crystallizers, crystallizers with evaporators, etc.)
11.	Centrifuge
12.	Drying unit (hot air dryer of adequate size attached with scrubber and stack)
13	Effluent treatment plant comprising of neutralization, coagulation & sedimentation.
14.	ETP Sludge handling unit (Filter/Centrifuge/ Sludge drying bed etc.)
15.	Covered hazardous waste storage area to store filter mud, residue from scrubber and ETP sludge in HDPE bags/drums.

4. 5 Utilization of Spent acid containing Molybdenum

This SoP is applicable only for utilization of Spent acid containing Molybdenum as described below:

Type of HW	Source of generation	Recovery/Product
Spent Acid - Containing Molybdenum	Filament and bulb Industry	Molybdenum Trioxide

The utilization process shall involves pre-heating of spent acid containing Molybdenum in heating column up to 50^{o}C followed by 3-stages regulated heating from 70 up to 110^{o}Cfor removal of water and nitric acid. The slurry is further heated to 125^{o}C in agitator vessel to produce Molybdenum Trioxide (precipitate) and Sulphuric Acid. The cooled slurry is filtered to recover Molybdenum Trioxide, while spent sulphuric acid is neutralised with lime. Dilute nitric acid is recovered in condenser

A. **Standard Operating Procedure**

(1) Collection Storage & Handling of Spent acid containing Molybdenum

(a) In case of utilisation at a facility other than source of generation

- The Spent acid containing Molybdenum shall be procured only in stainless steel/rubber lined tankers/HDPE drums.
- There should be designated space for unloading Spent acid containing Molybdenum into stainless steel/rubber lined storage tank.
- The receiving storage tank shall be placed above the ground and contained with low raise bund wall & acid proof floor with slope to collect spillages, if any to collection pit.
- Transportation of Spent acid containing Molybdenum shall be carried out by sender or receiver (utilizer) after obtaining authorisation from the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
- It shall be ensured that spent acid containing Molybdenum is procured from the filament and bulb industries who have valid authorization for the same from the concerned SPCB as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of Spent acid containing Molybdenum shall be entered:
    - Address of the sender
    - Date of dispatch
    - Quantity procured
    - Seal and signature of the sender
    - Date of receipt in the premises

(b) In case of in-house Utilisation

- The spent acid containing Molybdenum shall be stored into stainless steel collection tank through SS pipes with requisite safeguards ensuring no leakage and spillage of the wastes.

(2) The collected spent acid shall be transferred to heating columns and then to heated slurry vessel through chemical transfer pumps and SS pipes.

(3) The entire process area shall have acid proof tiles with spillage collection pits and transfer of spillage back to process shall be carried using pipes and pumps.

(4) The spillages from collection pit shall be transferred to ETP or heating column, as the cases may be, through chemical process pump.

(5) Separate collection/storage vessels shall be provided for spent acid, acidic condensate (HNO3), acidic filtrate (H2SO4), slurry cooling, heated slurry vessel and filter vessel.

(6) The spent sulphuric acid shall be treated with lime and chemical gypsum so generated may be sent to cement plants for further utilization, else it may be sent to common TSDF for disposal.

(7) The acidic condensate containing nitric acid shall be utilized in preparing fresh pickling bath by supplementing use of fresh nitric acid and water to the extent of 11% of 100% HNO3 used..

(8) There shall be no manual handling of spent acids. The same shall be handled mechanically (chemical process pump) and spillage or pilferage shall be controlled.

(9) Acid fumes/vapour liberated from heating columns and slurry vessel shall be connected to fume extraction system attached to a condenser unit followed by scrubber with water as scrubbing medium. The scrubbed gases shall be vented through stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCBs, whichever is higher. Scrubber shall also be connected to fume extraction hood above the heating columns to receive any fugitive emissions

(10) The condenser shall have either water cooled condenser with cooling tower or chilled brine/water circulating condenser. In case

(11) Sources of wastewater generation may be

a) Floor washing/reactor wash/vehicle wash/spillages, etc.
b) Scrubber bleed liquor
c) Spent mother liquor from centrifuge

The above wastewater shall be Physico-Chemically treated by neutralization, precipitation, coagulation & sedimentation and the effluent treated should be recycled so as to meet zero discharge conditions or applicable discharge standards, in case discharge has been permitted by the concerned SPCBs.

(12) The hazardous waste (viz. filter cloth, residue from scrubber, ETP sludge and any other residues) generated from utilization process shall be packaged and temporarily stored in a dedicated hazardous waste storage area within the unit premise and disposed in common hazardous waste treatment, storage and disposal facility within 90 days.

(13) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(14) The unit shall comply with following standards:

- *Source Emission Standards(Stack)-*

  Acid Mist (H_2SO_4) - 30 mg/Nm^3.
  NO_X– 400 mg/Nm^3

- *Work Zone standards –*

Sulphuric acid – 0.1 mg/m^3 TWA*, *3 mg/m^3 STEL**
NO – 30 mg/m^3TWA
NO_2 – 9 mg/m^3 Ceiling limit
*Nitric Acid –5 mg/m^3 TWA**

* T*ime-weighted average (TWA), Short-term exposure limits (STEL).*
The Permissible Exposure Limit is 8-hour TWA.

A short-term exposure limit (STEL) is the acceptable average exposure over a short period of time, usually 15 minutes as long as the Time weighted average is not exceeded. 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.

(15) The unit shall install online continuous monitoring system for NO_X in stack connected to scrubber and transmit online emission data to the servers of concerned SPCB and CPCB.

(16) Monitoring of the specified parameters for source and work zone emissions shall be carried out by NABL/EPA accredited laboratories quarterly and the results shall be submitted to the concerned SPCB quarterly.

(17) Transportation of the hazardous waste generated from utilisation process shall be carried out by sender or receiver (TSDF) as per the authorisation issued by the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(18) 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.

(19) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(20) A log book with information on date wise generation/receipt of Spent Molybdenum acid, source of procurement, date wise quantity of utilization, quantity of products (Molybdenum trioxide) produced, quantity of acidic condensate recovered (HNO3), quantity of acidic filtrate (H2SO4) generated and gypsum produced, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(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 unit 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) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
1.	**Collection Storage & Handling of Spent acid containing Molybdenum**
(a)	In case of utilisation at a facility other than source of generation
	- Stainless steel/rubber lined tankers/HDPE drums shall be used for receiving spent acid containing Molybdenum - Designated space for unloading Spent acid containing Molybdenum into stainless steel/rubber lined storage tank. - The receiving storage tank shall be placed above the ground and contained with low raise bund wall - Provide acid proof floor with slope connected to spillage collection pit.
	OR
(b)	In case of in-house Utilisation
	- Spent acid containing Molybdenum shall be received into stainless steel collection tank through SS pipes and chemical process pumps
2.	Separate collection/storage vessels of stainless steel shall be provided for spent acid containing Molybdenum, acidic condensate (HNO_3), acidic filtrate (H_2SO_4), slurry cooling, heated slurry vessel and filter vessel.
3.	Entire working area shall be made of leak-proof and acid proof floor tiles with adequate slope to collect spillages, if any. No vessels shall be installed under the ground.
4	The spillages from collection pit shall be transferred to ETP or heating column, as the cases may be, through chemical process pump.
5	Vessels shall be heated with electrical heating / jacket heating system
6	Separate heating columns for pre-heating and 3-stages regulated heating from 70 up to 110^{o}C.
7	Condensate tank (to receive acidic fumes) with water cooled condenser and cooling tower or chilled brine circulating condenser.
8	Fume extraction system for acidic fumes generated from all heating vessels via condensate tank and scrubber with ID fan connected to stack of 06 meter height above the roof or as prescribed by the concerned SPCB (whichever is higher).
9	Filter press
10	Centrifuge with discharge connected to ETP
11	Drying unit (Optional) fume extraction system connected to scrubber and stack.

12	Effluent treatment plant shall comprise of treatment units viz. neutralization and/or precipitation, coagulation, sedimentation and Filter/Centrifuge/ Sludge drying bed etc for sludge handling
13	Covered hazardous waste storage area to store filter cloth, residue from scrubber, ETP sludge and other residues in HDPE bags/drums.
14	Online analyser for NO_X in stack connected to scrubber in time bound manner

4. 6 Utilization of Spent HCl generated from steel industry

This SoP is applicable only for utilization of Spent hydrochloric acid as described below:

Type of HW	Source of generation	Recovery/Product
Spent Acid - Containing HCl	Metal surface cleaning in steel and rolling industry	Ferric Chloride

The utilization process shall involve reaction of Spent HCl with iron scrap followed bu chlorination with chlorine gas to produce Ferric Chloride solution. The impurities in Ferric Chloride solution are filtered using filter press.

A. <u>Standard Operating Procedure</u>

(1) Collection Storage & Handling of Spent HCl

(a) In case of utilisation at a facility other than source of generation

- The Spent HCL shall be procured only in stainless steel/rubber lined tankers/HDPE drums.
- There should be designated space for unloading Spent HCl into stainless steel/rubber lined storage tank.
- Transportation of Spent HCl shall be carried out by sender or receiver (utilizer) after obtaining authorisation from the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
- It shall be ensured that spent HCl is procured from steel and rolling industries who have valid authorization for the same from the concerned SPCB as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of Spent HCl shall be entered:
    - Address of the sender
    - Date of dispatch
    - Quantity procured
    - Seal and signature of the sender
    - Date of receipt in the premises

(b) In case of in-house Utilisation

- The spent HCl shall be stored in a tank with acid proof lining with requisite safeguards ensuring no leakage and spillages.

(2) The receiving storage tank shall be placed above the ground and contained with low raise bund wall & acid proof floor with slope to collect spillages, if any to collection pit.

(3) The entire process area shall have leak-proof and acid proof floor tiles with adequate slope to collect spillages, if any, into a collection pit.

(4) The spillages from collection pit shall be transferred to ETP or reaction tank, as the cases may be, through chemical process pump.

(5) There shall be no manual handling of the spent acid. Chemical process pump shall be used for transfer of spent acid to the process units.

(6) The reaction vessels shall be connected with suction hood above the feeding point (of iron scrap) to control acid fume/vapour liberated from all the reaction vessels. The suction hood shall be connected with water scrubber and stack.

(7) The reacted liquor shall be chlorinated in series of chlorinated vessels where chlorine gas is passed in counter-flow from last reaction vessel to first chlorinator. The unreacted Chlorine from Chlorinator shall be routed to an in-line scrubber where Ferrous Chloride from the reaction vessels shall be used as scrubbing medium. The vent of this in-line scrubber shall be send to water scrubber connected to stack. The scrubbed water shall be used in the process (i.e. reaction vessels).

(8) The Ferric Chloride solution is stored into a retention tank where impurities, if any, will settle down. Such impurities may also be removed by filtration.

(9) The stack shall be atleast 06 meter above roof top or of height as prescribed by the concerned SPCB, whichever is higher.

(10) The wastewater generated from Floor washing/reactor wash/spillages and leakages shall be treated in effluent treatment plant comprising of collection tank, neutralization, coagulation/flocculation, sedimentation, sludge handling unit. The treated effluent shall be recycled so as to meet zero discharge conditions or applicable discharge standards, in case discharge has been permitted by the concerned SPCB.

(11) The hazardous wastes (viz. reactor residue, scrubber residue and ETP Sludge) generated from utilization process shall be packaged and temporarily stored in a dedicated hazardous waste storage area within the unit premise and disposed in common hazardous waste treatment, storage and disposal facility within 90 days.

(12) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(13) The Ferric Chloride produced by utilizing Spent HCl shall be used only for industrial purposes and not to be used in treatment of drinking water.

(14) The unit shall label the product i.e. Ferric Chloride as "*not be utilized for drinking water purification and to be used only for industrial purposes"*.

(15) The unit shall comply with following standards:

- *Source Emission Standards-*

Hydrochloric Acid vapour and mist in stack attached to Reaction tank - 35 mg/Nm^3.

- *Work Zone standards –*

Hydrochloric acid – 7 mg/m^3 ceiling*,
Chlorine – 3 mg/m^3 TWA

** 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.*
Time-weighted average (TWA), the Permissible Exposure Limit is 8-hour TWA.

(16) Monitoring of the specified parameters for source and work zone emissions shall be carried out by NABL/EPA accredited laboratories quarterly and the results shall be submitted to the concerned SPCB quarterly.

(17) Transportation of the hazardous waste (viz. reactor residue, scrubber residue and ETP Sludge) shall be carried out by sender or receiver (TSDF) as per the authorisation issued by the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(18) 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.

(19) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(20) A log book with information on source, quantity and date of procurement/generation of the Spent HCl, quantity & date wise utilization, quantity of other raw material used, quantity of FeCl3 produced, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(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 unit 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) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
1.	Collection Storage & Handling of Spent acid containing Molybdenum
(a)	In case of utilisation at a facility other than source of generation
	- Stainless steel/rubber lined tankers/HDPE drums shall be used for receiving spent HCl - Designated space for unloading Spent HCL into stainless steel/rubber lined storage tank. -
	OR
(b)	In case of in-house Utilisation
	- Spent HCl shall be stored in a tank with acid proof lining
2.	The receiving storage tank shall be placed above the ground and contained with low raise bund wall & acid proof floor with slope to collect spillages, if any to collection pit.
3.	Storage tank (s) of adequate capacity to store Spent acid containing HCl. Size of said tank (s) shall be adequate to store at least one week requirement of the said hazardous wastes to be used as raw material
4.	Spent HCl & fresh HCl shall be transferred from tankers to storage tank and transfer subsequently to process area through chemical process pumps.
5.	Collection pit for collection of spillages from the working area and unloading area.
6.	Pump to transfer spillages from collection pit to ETP or reaction tank as the cases may be.
8.	Adequate Storage facility for Hydrochloric acid and Iron scrap
9.	Reaction tanks with suction arrangement above feeding point connected to water scrubber and stack
10.	Chlorinator vessels with counter circulation of chlorine gas.
11.	In-line scrubber with Ferrous Chloride from reactor as scrubbing medium. The vent of this in-line scrubber shall be routed through water scrubber.

12.	Stack connected to scrubber shall have minimum height of 06 m above the roof top or as prescribed by the concerned SPCB, whichever is higher. Vent shall have easy access to port hole and requisite facilities for conducting stack monitoring
13.	Separate chlorine cylinder storage shed with Chlorine gas sensor and alarm system.
14.	Effluent treatment plant with neutralization, coagulation, sedimentation and Filter/Centrifuge/ Sludge drying bed etc. for sludge handling
15.	Covered hazardous waste storage area to store residue from reactor, residue from scrubber, ETP sludge and filter cloth in HDPE bags/drums.

4. 7 Utilization of Used Anode Butt

This SoP is applicable only for utilization of Used Anode Butt as described below:

Type of HW	Source of generation	Recovery/Product
Used Anode Butt	Aluminum Smelter units	Carbon pellets and High Energy Coke for use in Steel furnaces/foundries

The utilisation process involves removal of fluoride bearing bath material from the surface of Used anode butts in a shot blasting machine followed by crushing and screening. The fine particles are mixed with molasses, bentonite, Dextrin, Anode fines, etc. to produce carbon pellets in a palletisation machine. The coarse particles are further crushed in a crusher and mixed with pet coke to produce High Energy Coke.

A. Standard Operating Procedure

(1) The used anode butt shall be procured from the Aluminium smelter units without cutting and breaking of the same and of size not less than 250 mm.

(2) The unit shall store used anode butts in covered storage shed(s) within premises, as authorized by the concerned SPCB under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, so as to eliminate rain water intrusion.

(3) Cutting or sizing of used anode at the unit shall not be allowed prior to shot-blasting

(4) Handling/transfer of used anodes and shot blasted anodes are required to be done using mechanical loader (such as hydra loader with pallet fork, etc.).

(5) Minimum 25 mm of outer layer of used anode butt shall be removed during shot blasting and such shot blasting machine shall have dust/ball collection system followed by dust and ball separation unit so that separated balls can be reused in shot blasting. The said system shall be operated under suction and outlet of dust and ball separation system shall be connected to a bag dust filter house and stack.

(6) Surface cleaned material is required to be handled by mechanical means for crushing, screening and blending operations.

(7) Crushing, screening, transfer and blending operations shall be carried out in enclosed systems connected to dust extraction systems with bag dust collectors and stack. It shall be ensured that the height of the stack shall be as specified in the consent issued by concerned SPCB or atleast 06 m above roof top of adjacent structure, whichever is higher.

(8) The process of mixing/ blending shall not involve any chemical reaction so that there are no air emissions or generation of heat.

(9) The percentage mix of cleaned used anode butt in the product shall not exceed 50% and the record of the same shall be maintained by the unit.

(10) The unit shall only produce Carbon Pellet and High Energy (HE) Coke from the cleaned used anode butts for utilization in Steel Plant/Steel foundries.

(11) The unit shall maintain proper ventilation in the work zone of loading/unloading of Used Anode Butt and shot blasting machine. all personnel involved in the plant operation shall wear proper personal protective equipments such as masks, safety gloves, goggles, safety shoes etc

(12) The PM_{10} and Fluoride in fugitive dust of the work zone area of the crushing and mixing operations shall not exceed 4000 µg/m3 and 2.5 mg/m^3 (8-hour time weighted average (TWA)). The stack emissions shall comply with PM and total fluoride emission of 150 and 25 mg/Nm^3.

(13) Monitoring of work zone and stack emissions shall be carried out quarterly. The monitoring shall be carried out by NABL/EPA accredited laboratories and the results shall be submitted to the concerned SPCB quarterly

(14) Transportation of the aforesaid waste shall be carried out by the sender or receiver (utilizer) after obtaining authorization from the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(15) It shall be ensured that the aforesaid hazardous waste is procured from the Aluminium Smelter units who have valid authorization for the same from the concerned State Pollution Control Board as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(16) The residue generated from the shot blasting operation and bag filter house shall be packaged in HDPE bags and temporarily stored in a dedicated hazardous waste storage area and sent to common hazardous waste TSDF within 90 days from generation of the waste. Such hazardous waste shall be stored under covered shed with proper ventilation.

(17) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of used anode butt shall be entered:

- Address of the sender
- Date of dispatch

- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(18) The unit shall submit quarterly and annual information on used anode butts consumed, its source, products generated or resources conserved (specifying the details like type and quantity of resources conserved) to the concerned SPCB.

(19) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(20) A log book with information on source of procurement, quantity, date wise utilization of used anode butt, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable and shall be made available for inspecting officials from SPCB/CPCB.

(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 unit 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) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
1.	Storage shed for storage of Used Anode Butt. The shed shall be covered so as to eliminate rain water intrusion.
2.	Size/capacity of storage shed to be adequate to store at least one weeks requirement of used anode butt
3.	Mechanical loader (such as hydra loader with pallet fork, etc.) for handling of used anodes in shot-blaster machine
4.	Shot blasting machine of adequate chamber size so as to feed used anode butt of size about 1.5 m x 1.0 m x 0.5 m directly into the chamber without cutting and breaking.
5.	Unit for separation of shot blasting balls from shot blasted residue
6.	Bag house dust collectors attached with shot-blaster machine followed by stack
7.	Mechanical means of waste handling for crushing, grinding screening and

	blending operations. a) Crushers (such as Jaw crusher, Triple Roller) b) Grinder (such as ball mills , roller mills-), as per product requirement c) Mechanical screens as per product requirement d) Vertical pellet extruder machine (in case of Carbon pellets) e) Mechanical mixer (s) f) Conveyor system for transfer of material, as per requirement
8.	Crushing, screening, grinding, transfer and blending operations to be carried under closed and covered area and connected to bag filters and stack
9.	Provision of ventilation in process and waste handling area
10.	Packaging & storage of residue generated during utilization process in dedicated storage area

4. 8 Utilization of Used Anode Butt

This SoP is applicable only for utilization of Used Anode Butt as described below:

Type of HW	Source of generation	Recovery/Product
Used Anode Butt	Aluminum Smelter units	Carbon Blended Coke / Electrode carbon Paste / Carburizer for use in Steel or Ferro Alloy furnaces

The utilisation process involves following steps;

For Electrode Carbon Paste:

Removal of fluoride bearing bath material from the surface of Used anode butt in a shot blasting machine followed by crushing, screening, grinding and mixing in a mixer with pet coke and coal tar pitch. This material is then moulded and cooled to produce Electrode Carbon Paste for use in Ferro Alloy Plants.

For Carburizer:

Removal of fluoride bearing bath material from the surface of Used anode butt in a shot blasting machine. The cleaned anode butt is crushed in a crusher, blended with Calcined petroleum coke and screened to produce Carburizer for use in Steel plants.

A. Standard Operating Procedure

(1) The used anode butt shall be procured from the Aluminium smelter units without cutting and breaking of the same and of size not less than 250 mm.

(2) The unit shall store used anode butts in covered storage shed(s) within premises, as authorized by the concerned SPCB under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, so as to eliminate rain water intrusion.

(3) Cutting or sizing of used anode at the unit shall not be allowed prior to shot-blasting

(4) Handling/transfer of used anodes and shot blasted anodes are required to be done using mechanical loader (such as hydra loader with pallet fork, etc.).

(5) Minimum 25 mm of outer layer of used anode butt shall be removed during shot blasting and such shot blasting machine shall have dust/ball collection system followed by dust and ball separation unit so that separated balls can be reused in shot blasting. The said system shall be operated under suction and outlet of dust and ball separation system shall be connected to a bag dust filter house and stack.

(6) Surface cleaned material is required to be handled by mechanical means for crushing, screening, grinding and mixing/blending operations.

(7) Crushing, screening, grinding, transfer and blending operations shall be carried out in enclosed systems connected to dust extraction systems with bag dust collectors and stack. It shall be ensured that the height of the stack shall be as specified in the consent issued by concerned SPCB or atleast 06 m above roof top of adjacent structure, whichever is higher.

(8) The process of mixing/ blending shall not involve any chemical reaction so that there are no air emissions or generation of heat.

(9) The percentage mix of cleaned used anode butt in the product shall not exceed 50% and the record of the same shall be maintained by the unit.

(10) The effluent generated, if any, shall be discharged as per the conditions stipulated by the SPCB under the Water (Prevention and Control of Pollution) Act, 1974.

(11) The unit shall only produce Electrode Carbon Paste/Carburizer from the cleaned used anode butts for utilization in Ferro Alloy Plant & Steel Plant respectively.

(12) The unit shall maintain proper ventilation in the work zone of loading/unloading of Used Anode Butt and shot blasting machine. all personnel involved in the plant operation shall wear proper personal protective equipments such as masks, safety gloves, goggles, safety shoes etc

(13) The PM10 and Fluoride in fugitive dust of the work zone area of the crushing and mixing operations shall not exceed 4000 µg/m3 and 2.5 mg/m3 (8-hour time weighted average (TWA)). The stack emissions shall comply with PM and total fluoride emission of 150 and 25 mg/Nm3.

(14) Monitoring of work zone and stack emissions shall be carried out quarterly. The monitoring shall be carried out by NABL/EPA accredited laboratories and the results shall be submitted to the concerned SPCB quarterly

(15) Transportation of the aforesaid waste shall be carried out by the sender or receiver (utilizer) after obtaining authorization from the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(16) It shall be ensured that the aforesaid hazardous waste is procured from the Aluminium Smelter units who have valid authorization for the same from the concerned SPCB as required under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(17) The residue generated from the shot blasting operation and bag filter house shall be packaged in HDPE bags and temporarily stored in a dedicated hazardous waste storage area and sent to TSDF within 90 days from generation of the waste. Such hazardous waste shall be stored under covered shed with proper ventilation.

(18) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of used anode butt shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(19) The unit shall submit quarterly and annual information on used anode butts consumed, its source, products generated or resources conserved (specifying the details like type and quantity of resources conserved) to the concerned SPCB.

(20) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(21) A log book with information on source of procurement, quantity, date wise utilization of Used anode butt, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable and shall be made available for inspecting officials from SPCB/CPCB.

(22) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.

(23) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
1.	Storage shed for storage of Used Anode Butt. The shed shall be covered so as to eliminate rain water intrusion.
2.	Size/capacity of storage shed to be adequate to store at least one weeks requirement of used anode butt
3.	Mechanical loader (such as hydra loader with pallet fork, etc.) for handling of used anodes in shot-blaster machine

4.	Shot blasting machine of adequate chamber size so as to feed used anode butt of size about 1.5 m x 1.0 m x 0.5 m directly into the chamber without cutting and breaking.
5.	Unit for separation of shot blasting balls from shot blasted residue
6.	Bag house dust collectors attached with shot-blaster machine followed by stack
7.	Mechanical means of waste handling for crushing, grinding screening and blending operations. a) Crusher (such as Jaw crusher) b) Grinder (such as ball mills , roller mills) - as per product requirement c) Mechanical screens – screen size as per product requirement d) Mechanical mixer e) Conveyor system for transfer of material - as per requirement
8.	Crushing, screening, grinding, transfer and blending operations to be carried under closed and covered area and connected to bag filters and stack
9.	Provision of ventilation in process and waste handling area
10.	Thermic fluid heater for heating the mixture i.e. cleaned anode butt, calcined petroleum coke and coal tar pitch in case of manufacturing Electrode Carbon Paste
11.	Packaging & storage of residue generated during utilization process in dedicated storage area

4. 9 Utilization of Used Anode Butt (pre-processed)

This SoP is applicable only for utilization of Used Anode Butt as described below:

Type of HW	Source of generation	Recovery/Product
Pre-processed Used Anode Butt	Aluminum Smelter units	Green Anodes for use in Aluminium Smelters

The utilisation process involves crushing and screening of pre-processed Used anode butt followed by mixing with petroleum coke & coal tar pitch in a heater (thermic fluid) to produce Anode blocks, which are baked at 1100 ^{0}C in baking furnace for 28 hrs to produce Green Anodes for use in Aluminium Smelters after rodding operation.

A. Standard Operating Procedure

- **For Pre-processing of Used Anode Butt**

It is required to pre-process the used anode butt to remove the bath material prior to utilize in making green anodes. Pre-processing may consists of the following steps:

(1) Minimum 25 mm of outer layer of used anode butt shall be removed in a shot blasting unit connected with bag dust filter house and stack.

(2) Handling/transfer of used anodes and shot blasted anodes are required to be done using mechanical loader (such as hydra loader with pallet fork, etc.).

(3) If required, shot blasted material shall be crushed to desired size using mechanical crusher connected to dust extraction system with bag filter, ID fan and stack of height as specified in the consent issued by concerned SPCB/PCC.

(4) The residue generated from the shot blasting operation and bag filter house shall be packaged and temporarily stored in a dedicated hazardous waste storage area and sent to common or captive hazardous waste TSDF within 90 days from generation of the waste. Such hazardous waste shall be stored under covered shed with proper ventilation.

- **For manufacturing Green Anodes**

(5) Pre-processed used anode butt shall be crushed & screened to the desired size and mixed with petroleum coke & coal tar pitch in a thermic fluid heater to produce un-baked Green Anode blocks

(6) The un-baked green anode material shall be baked in anode baking unit at a temperature of 1100 ^{0}C for a period of 28 hours. The fumes from anode baking furnace shall be treated in Flue gas treatment Plant (FTP) where Alumina is used as dry scrubbing media. The treated gas are passed through bag dust collection system vented through stack of height as specified in the consent issued by concerned SPCB and Fluoride and PM emitted from the stack shall comply to the standards specified in the consent issued by the concerned SPCB.

(7) The unit shall store the pre-processed used anode butts in covered storage shed(s) within premises, as authorized by the concerned SPCB under the Hazardous and Other Waste (Management & Transboundary Movement) Rules, 2016, so as to eliminate rain water intrusion.

(8) Pre-processing material is required to be handled by mechanical means for crushing, screening and mixing operations.

(9) Crushing, transfer and mixing operations shall be carried out in enclosed systems connected to dust extraction systems with bag dust collectors, ID fan and stack. It shall be ensured that the height of the stack shall be as specified in the consent issued by concerned SPCB or atleast 06 m above roof top of adjacent structure, whichever is higher.

(10) The process of mixing/ blending shall not involve any chemical reaction thereby release of no air emissions or generation of heat.

(11) The percentage mix of pre-processed used anode butt in the product shall not exceed 50% and the record of the same shall be maintained by the unit.

(12) The unit shall maintain proper ventilation in the work zone of loading/unloading of pre-processed Used Anode Butt. All personnel involved in the plant operation shall wear proper personal protective equipments such as masks, safety gloves, goggles, safety shoes etc.

(13) The PM_{10} and Fluoride in fugitive dust of the work zone area of the crushing and mixing operations shall not exceed 4000 µg/m^3 and 2.5 mg/m^3 (8-hour time weighted average (TWA)). The stack emissions for the stack connected to the shot blasting unit, crushing and screening operations shall comply with PM and total fluoride emission of 150 and 25 mg/Nm^3.

(14) Monitoring of work zone and stack emissions shall be carried out monthly and quarterly respectively. The monitoring shall be carried out by NABL/EPA accredited laboratories and the results shall be submitted to the concerned SPCB quarterly

(15) The unit shall submit quarterly and annual information on pre-processed used anode butts consumed, its source, products generated or resources conserved (specifying the details like type and quantity of resources conserved) to the concerned SPCB.

(16) The residue generated from the bag filter house shall be packaged and temporarily stored in a dedicated hazardous waste storage area and sent to TSDF within 90 days from generation of the waste. Such hazardous waste shall be stored under covered shed with proper ventilation.

(17) The unit shall only produce Green Anodes from the cleaned used anode butts for utilization in Aluminium Smelters

(18) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of pre-processed used anode butt shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(19) Transportation of the pre-processed Used Anode Butt and residues generated during utilisation process shall be carried out by the sender or receiver (utilizer/TSDF operator) as per authorization issued by the concerned SPCB under the Hazardous and Other Waste (Management & Transboundary Movement) Rules, 2016.

(20) The unit shall ensure that the pre-processed used anode butt is procured from unit who has requisite authorization from SPCB for handling, pre-processing, packaging, transportation, transfer, etc. as applicable of Used anode butt generated within their plant and transferring/sale the pre-processed used anode butt to utilizer unit.

(21) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(22) A log book with information on source of procurement, quantity, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(23) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.

(24) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
I.	**Pre-processing of Used Anode Butt**
1.	Covered storage shed for storage of Used Anode Butt
2.	Mechanical loader (such as hydra loader with pallet fork, etc.) for handling of used anodes in shot-blaster machine
3.	Shot blasting machine of adequate chamber size so as to feed used anode butt directly into the chamber without cutting and breaking.
4.	Unit for separation of shot blasting balls from shot blasted residue
5.	Bag house dust collectors attached with shot-blaster machine followed by stack
6.	Packaging & storage of residue generated during shot blasting & from bag house in dedicated storage area
II.	**For manufacturing Green Anode**
1.	Storage shed for storage of Pre-Processed Used Anode Butt. The shed shall be covered so as to eliminate rain water intrusion.
2.	Size/capacity of storage shed to be adequate to store at least one weeks requirement of used anode butt
3.	Mechanical means of waste handling for crushing, grinding screening and blending operations. a) Crushers (such as Jaw crusher, Triple Roller,etc.) b) Mechanical screens (as per product requirement) c) Mechanical mixer (s) d) Conveyor system for transfer of material, as per requirement
4.	Crushing, transfer and mixing operations to be carried under closed and covered area and connected to bag filters and stack
5.	Provision of ventilation in process and waste handling area
6.	Thermic fluid heater for heating the mixture i.e. pre-processed anode butt, petroleum coke and coal tar pitch for manufacturing Green Anode

7.	Packaging & storage of residue generated during utilization process in dedicated storage area
8.	Flue Gas Treatment Plant for Anode Baking Unit with Alumina Scrubber & bag house connected to stack

4.10 Utilization of Used Anode Butt (pre-processed)

This SoP is applicable only for utilization of pre-processed Used Anode Butt as described below:

Type of HW	Source of generation	Recovery/Product
Pre-processed Used Anode Butt	Aluminum Smelter units	Carbon Paste for use in Ferro Alloy Plants

The utilisation process involves crushing and screening of pre-processed Used anode butt followed by mixing with petroleum coke & coal tar pitch in thermic fluid heater to produce Carbon Electrode Paste.

A. Standard Operating Procedure

- **For Pre-processing of Used Anode Butt**

It is required to pre-process the used anode butt to remove the bath material prior to utilize in making carbon Paste. Pre-processing may consists of the following steps:

(1) Minimum 25 mm of outer layer of used anode butt shall be removed by shot blasting and such shot blasting machine shall have dust/ball collection system followed by dust and ball separation unit so that separated balls can be reused in shot blasting. The said system shall be operated under suction and outlet of dust and ball separation system shall be connected to a bag dust filter house and stack.

(2) Handling/transfer of used anodes and shot blasted anodes are required to be done using mechanical loader (such as hydra loader with pallet fork, etc.).

(3) If required, shot blasted material shall be crushed to desired size using mechanical crusher connected to dust extraction system with bag filter, ID fan and stack of height as specified in the consent issued by concerned SPCB/PCC or atleast 6 m above roof top of adjacent structure, whichever is higher.

(4) The residue generated from the shot blasting operation and bag filter house shall be packaged and temporarily stored in a dedicated hazardous waste storage area and sent to TSDF within 90 days from generation of the waste. Such hazardous waste shall be stored under covered shed with proper ventilation.

For Producing Carbon Paste

(5) Only pre-processed Used anode butt crushed & screened to desired size shall be mixed with petroleum coke & coal tar pitch in a thermic fluid heater to produce Carbon Electrode Paste.

(6) The unit shall store the pre-processed used anode butts in covered storage shed(s) within premises, as authorized by the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, so as to eliminate rain water intrusion.

(7) Pre-processing material is required to be handled by mechanical means for crushing, screening and mixing operations.

(8) Crushing, transfer and mixing operations shall be carried out in enclosed systems connected to dust extraction systems with bag dust collectors, ID fan and stack. It shall be ensured that the height of the stack shall be as specified in the consent issued by concerned SPCB or atleast 06 m above roof top of adjacent structure, whichever is higher.

(9) The process of mixing/ blending shall not involve any chemical reaction thereby release of no air emissions or generation of heat.

(10) The percentage mix of pre-processed used anode butt in the product shall not exceed 50% and the record of the same shall be maintained by the unit.

(11) The unit shall maintain proper ventilation in the work zone of loading/unloading of pre-processed Used Anode Butt. All personnel involved in the plant operation shall wear proper personal protective equipments such as masks, safety gloves, goggles, safety shoes etc.

(12) The PM10 and Fluoride in fugitive dust of the work zone area of the crushing and mixing operations shall not exceed 4000 µg/m3 and 2.5 mg/m3 (8-hour time weighted average (TWA)). The stack emissions for the stack connected to the shot blasting unit, crushing and screening operations shall comply with PM and total fluoride emission of 150 and 25 mg/Nm3.

(13) Monitoring of work zone and stack emissions shall be carried out monthly and quarterly respectively. The monitoring shall be carried out by NABL/EPA accredited laboratories and the results shall be submitted to the concerned SPCB quarterly

(14) The unit shall submit quarterly and annual information on spent anode butts consumed, its source, products generated or resources conserved (specifying the details like type and quantity of resources conserved) to the concerned SPCB.

(15) The residue generated from the bag filter house shall be packaged and temporarily stored in a dedicated hazardous waste storage area and sent to TSDF within 90 days from generation of the waste. Such hazardous waste shall be stored under covered shed with proper ventilation.

(16) The unit shall only produce Carbon Electrode Paste from the cleaned used anode butts for utilization in Ferro Alloy Plants

(17) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of pre-processed used anode butt shall be entered:

- Address of the sender
- Date of dispatch

- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(18) Transportation of the pre-processed Used Anode Butt and residues generated during utilisation process shall be carried out by sender or receiver (utilizer/TSDF operator) as per authorization issued by the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, with requisite safeguards ensuring no pilferage of the wastes or leachates, if any.

(19) The unit shall ensure that the pre-processed used anode butt is procured from unit who has requisite authorization from SPCB for handling, pre-processing, packaging, transportation, transfer, etc. as applicable of Used anode butt generated within their plant and transferring/sale the pre-processed used anode butt to his unit.

(20) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(21) A log book with information on source of procurement, quantity, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(22) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.

(23) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
I.	**Pre-processing of Used Anode Butt**
1.	Covered storage shed for storage of Used Anode Butt
2.	Mechanical loader (such as hydra loader with pallet fork, etc.) for handling of used anodes in shot-blaster machine
3.	Shot blasting machine of adequate chamber size so as to feed used anode butt directly into the chamber without cutting and breaking.
4.	Unit for separation of shot blasting balls from shot blasted residue

5.	Bag house dust collectors attached with shot-blaster machine followed by stack
6.	Packaging & storage of residue generated during shot blasting & from bag house in dedicated storage area
II.	**For manufacturing Carbon Paste**
1.	Storage shed for storage of Pre-Processed Used Anode Butt. The shed shall be covered so as to eliminate rain water intrusion.
2.	Size/capacity of storage shed to be adequate to store at least one weeks requirement of used anode butt
3.	Mechanical means of waste handling for crushing, grinding screening and blending operations. e) Crushers (such as Jaw crusher, Triple Roller) f) Mechanical screens (as per product requirement) g) Mechanical mixer (s) h) Conveyor system for transfer of material, as per requirement
4.	Crushing, transfer and mixing operations to be carried under closed and covered area and connected to bag filters and stack
5.	Provision of ventilation in process and waste handling area
6.	Thermic fluid heater for heating the mixture i.e. pre-processed anode butt, petroleum coke and coal tar pitch for manufacturing Green Anode
7.	Packaging & storage of residue generated during utilization process in dedicated storage area

4.11 Utilization of Coal Tar/Tarry Residue

This SoP is applicable only for utilization of Coal Tar/Tarry Waste as described below:

Type of HW	Source of generation	Recovery/Product
Coal Tar/Tarry residue	Coal gasifier units	As supplementary fuel in furnace for energy recovery in sodium silicate units

The utilisation process involves heating of coal tar and firing of liquid coal tar through burners in pre-heated furnace (after the furnace achieves a temperature>1100^{o}C) as a supplementary fuel in place of conventional fuels such as furnace oil, LPG, CNG, LDO etc. The solid sodium silicate glass cullet is mixed with water and kept in open pans and heated from bottom utilising the waste heat (after heat economiser) to liquefy the amorphous solid glass. The sodium silicate solution thus produced is stored in vessels

The flue gases after passing through heat economiser and heating pans is cleaned in alkali scrubbers.

A. <u>Standard Operating Procedure</u>

(1) Tarry waste shall be procured only in tanker mounted vehicles.

(2) Tarry waste shall be received into storage tank and a transfer pump shall be used to transfer the tarry waste to day tank. All the tanks and transfer pump shall be under covered shed to eliminate any contact with rain water. The storage tanks shall be provided with water seals to all probable leaking points so as to minimise the VOCs emissions.

(3) Melting of tarry waste for use in furnace shall be done by using electric heaters and molten tarry waste shall be transferred using transfer pumps to day-tank.

(4) Utilisation of tarry waste shall not exceed 0.3 MT per 1 MT of liquid sodium silicate production.

(5) The unit shall not operate the furnace at >70% of the rated capacity while utilizing tarry waste.

(6) Tarry waste shall not be injected into the furnace until the temperature of the furnace is heated up to > 1100^{o}C, using conventional fuels such as furnace oil, LPG, CNG, LDO etc. as per the consent issued by the concerned SPCB under Air (Prevention and Control of Pollution) Act, 1981.

(7) Fume extraction hoods shall be provided above the tarry waste melting unit, day-tank and molten cullet tapping point and the same shall be channelized as combustion air into the furnace.

(8) The hot flue gases shall be passed through heat economiser (for heating combustion air) followed by pan heaters and treated in alkali scrubber with ID fan connected to stack of height as specified by SPCB.

(9) The scrubber bleed liquor shall be treated in an effluent treatment plant and treated effluent shall be discharge as per the conditions stipulated in consent issued by the concerned SPCB under Water (Prevention and Control of Pollution) Act, 1974.

(10) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(11) The unit shall install online analyzers for CO emission monitoring in stack with provision to transfer online emission data to SPCB and CPCB server.

(12) The unit shall comply with following emission standards ;

Stack Emission Standards-

- Particulate Matter - as stipulated by concerned SPCB
- Oxides of Nitrogen - 400 mg/Nm^3
- Carbon Monoxide – 100 mg/Nm^3
- TOC – 20 mg/Nm^3
- SO_2 – 200 mg/Nm^3

Proposed Work Zone standards –

(8-hour time-time weighted average values)

- Respirable dust (PM10) - 5000 µg/m3
- Carbon Monoxide - 50 ppm

- Coal tar volatiles (benzene-soluble fraction viz. anthracene, Benzo (a) Pyrene, phenanthrene, Dibenzo[b,e]pyridine, chrysene & pyrene) : 0.2 mg/m3

(13) Monitoring of the specified parameters for source and work zone emissions (PM_{10} & CO) shall be carried out by NABL/EPA accredited laboratories and the results shall be submitted to the concerned SPCB quarterly and monthly respectively. The results of coal tar volatiles as above shall be carried out annually.

(14) The unit shall submit quarterly and annual information on tarry waste consumed; its source, products generated or resources conserved (specifying the details like type and quantity of resources conserved.) to the concerned SPCB.

(15) The residue generated from flue gas scrubber and tar-containing wastes (generated due to spills/debris containing tarry wastes, used oils, scrubber residue etc.) shall be disposed as hazardous wastes through common TSDFs as per the conditions stipulated under consent/authorization issued by concerned SPCB.

(16) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of coal tar/tarry waste shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(17) Transportation of the tarry waste and residues generated during utilisation shall be carried out by the sender or receiver (utilizer/TSDF operator) as per the authorization issued by concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(18) It shall be ensured that the aforesaid hazardous wastes are procured from coal gasifier units, who have valid authorization for the same from the concerned State Pollution Control Board as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(19) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(20) A log book with information on source and date of procurement, quantity, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(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 unit 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) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities.

S.No	Requisite Facilities
1.	MS tanks of for receiving and storage of Tarry waste.
2.	Cover over tarry waste storage tank, transfer pump, day-tank etc. so as to eliminate any contact with rain water.
3	Storage tanks for conventional fuels FO/LDO/LPG/CNG etc.
4.	Fire prevention facilities
5.	Covered shed for storage of HW generated (leaks/spills/debris containing tarry wastes, used oils, and scrubber residue etc.)
6.	Electric heating system for melting of tarry waste
7.	Fume extraction systems (with suction hoods and ducts) over storage tanks, tarry waste melting unit, molten cullet tapping point and day-tank connected to FD fan for use as combustion air.
8.	Flue gas heat recuperator (heat exchanger) to heat the combustion air
9.	Heating Pan where solid sodium silicate glass cullet is mixed with water and kept in open pans and heated using flue gases after economiser
10	Alkali Scrubber (for cleaning flue gases) connected to stack through ID fan
11	Scrub liquor recycling and ETP for treatment of bleed liquor
10.	Stack of height as prescribed by SPCB with easy access to port hole, for conducting stack monitoring
11	Online analyzers for CO emission monitoring in stack and connecting the online emission date to CPCB and SPCB servers.

4.12 Utilization of contaminated barrels/containers/drums containing hazardous wastes/chemicals

This SoP is applicable only for utilization of contaminated barrels/containers/drums as described below:

Type of HW	Source of generation	Recovery/Product
Contaminated barrels/containers/drums containing hazardous wastes/chemicals	Pharmaceuticals, food processing, cosmetic, textile, paint formulation and beverages industries	Cleaned barrel and drums for industrial re-use and/or production of plastic granules.

The utilisation of contaminated barrels/containers/drums for further re-use involves two stage cleaning i.e. Caustic /surfactants (detergent) cleaning in hot water, followed by fresh water cleaning with fixed nozzles arrangement. During the first stage of washing i.e cleaning with hot water with caustic solution up to 2% concentration or adequate quantity of detergent shall be carried out. In case of producing plastic granules, there should be two-stage cleaning as specified above followed by shredding. The waste water is recycled after treatment.

A. Standard Operating Procedure

(1) Collection Storage & Handling of contaminated barrels/containers/drums

- The unit shall procure only those drums for washing whose contents are compatible with cold water/hot water/detergents/caustic solutions and do not react or become spontaneously flammable or give off flammable/toxic gases in contact with the same.
- Transportation of contaminated barrels/containers/drums shall be carried out by sender or receiver (utilizer) after obtaining authorisation from the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
- It shall be ensured that the contaminated containers/drums/barrels are procured from the units, who have valid authorization for the same from the concerned State Pollution Control Board as required under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(2) The cleaning of barrels/ containers/ drums contaminated with chemicals listed below generated from pharmaceuticals, food processing, cosmetic, textile, paint formulation and beverages industries and not exhibiting characteristics of Class C3, C4, C5, C6 and C11 of Schedule II of HOWM Rules, 2016 and also does not liberate toxic gases in contact with air or water :

Ethyl Acetate	Glucose	Starch
Glycerine	Sorbitol	Calcium carbonate
Light Liquid Paraffin	Perfume	Vegetable Oil (Nutmeg , Eucalyptus, etc.)
Propylene Glycol	Methyasalicylate	Distilled Hydrogenated Coconut Fatty Acid
Cyanoacrylate Adhesive	Zinc Pyrithone	Surfactant (Sodium lauryl alcohol sulphate)
Thinner	Ethyl Panthenol	Iso Propyl Alcohol (IPA)
Povidone	Lactose monohydrate	Telmisartan

(3) The unit shall provide separate covered storage area for both contaminated containers and cleaned containers so as to eliminate rain water intrusion. Further, the sheds shall have proper slope and spillage collection pit so as collect spillages/floor washings. The collected spillages/floor washings shall be channelized to Effluent Treatment Plant for their treatment.

(4) Some vapors may liberate at the time of opening of cap of drums containing chemicals which may not be safe for the workers/personnel. Therefore, it shall be ensured that:

(i) The cap of the drums shall be opened only in well-ventilated area.

(ii) The personnel opening the drum shall wear protective gas mask while opening the drum.

(iii) Exhaust/suction blowers shall be provided in the shed area where drums will be opened.

(5) The manifest system and logbook should be maintained. Labeling should be done on all contaminated drums indicating source, date of receipt and chemicals/ hazardous waste which were stored.

(6) The unit shall ensure that prior to cleaning of contaminated containers/drums/barrels; the left-over or residual material in the drums is safely transferred into a separate container for storage and disposal at common Treatment Storage and Disposal Facility (TSDF).

(7) For washing of the drums/containers in both stages, the number of nozzles in 1 HP pump shall not exceed 03. Each of these nozzle can clean maximum 02 nos. of used drums per hour. Thus, number of nozzles and pump capacity thereof shall accordingly be installed for the permitted quantity of drums to be washed/day.

(8) The nozzles should have multiple jets to ensure that water jets hit entire inner surface of the containers.

(9) The unit shall provide bund wall along the container storage and washing area with proper slope and collection pit for channelization to Effluent treatment plant for further treatment.

(10) There should be a separate area with provision of hose pipe with spray nozzle for washing outer surface of the containers alongwith proper slope, periphery drainage, and collection pit followed by channelization to Effluent Treatment Plant for their treatment .

(11) The unit should ensure zero discharge by recycling of treated wastewater in the washing process.

(12) The effluent generated shall be evaporated and /or Physico-chemically treated by neutralization, coagulation, sedimentation, aeration, and filtration for recycling in the washing process, as applicable.

(13) If feasible, the unit shall become member of Common Effluent Treatment Plant (CETP) and send their effluent for final treatment and disposal to CETP.

(14) In case of evaporator, the flow to the evaporator should be regulated based on heating capacity of the evaporator. The vent of vacuum pump of the evaporator should be elevated at least up to 6 mtr above the roof level. MEE is preferred over simple evaporator. Water flow meter shall be installed at the inlet to evaporator and at the inlet to ETP.

(15) The labels on the drums/containers should be removed (preferable with a paint) and the cleaned containers should be labeled with following prominent indelible text

"Drum Cleaned by: M/s_____; Date: _____"

"For industrial use only

NOT for storing any food material"

(16) The above labelling is not applicable in case the cleaned drums are shredded and re-cycled.

(17) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipments such as masks, safety gloves, goggles, safety shoes etc.

(18) The monitoring of the effluent for the parameters specified in the Consent issued by the concerned SPCB shall be carried out quarterly through NABL/EPA accredited laboratory and report shall be submitted quarterly to the concerned the SPCB.

(19) Transportation of the contaminated drums and residues generated from cleaning shall be carried out by sender or receiver (drum cleaners / TSDF operator) as per authorization issued by concerned SPCB under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(20) The unit shall submit quarterly and annual information on quantity of drums procured & cleaned and its source, mode of cleaning the drum (i.e. detergent/caustic solution), quantity of waste water generated, treated & recycled and residue generated ((i.e. left over residue, Evaporator residue & ETP Sludge) or resources conserved (specifying the details like type and quantity of resources conserved) to the concerned SPCB.

(21) The residue generated from the drums, evaporator and sludge generated from ETP shall be packaged and temporarily stored in a dedicated hazardous waste storage area and sent to TSDF within 90 days from generation of the waste as per the conditions stipulated under consent/authorization issued by concerned SPCB. Such hazardous waste shall be stored under covered shed with proper ventilation.

(22) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of contaminated barrels/containers/drums shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured

- Seal and signature of the sender
- Date of receipt in the premises

(23) The unit shall maintain record of contaminated rums cleaned, residues 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 SPCB.

(24) A log book with information on source of procurement, quantity, date wise number of drums cleaned / quantity of granules manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(25) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.

(26) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No.	Requisite Facilities
1.	Separate covered storage area for both contaminated containers and cleaned containers with proper slope and spillage collection pit and channelizing to ETP.
2.	Exhaust/ Suction blowers in the contaminated drums/container handling and storage area.
3.	Size/capacity of storage sheds to be adequate to store at least 7 days requirement of contaminated drums
4.	Two stage cleaning facility (i.e. hot water with caustic solution/ detergent followed fresh water cleaning) having fixed nozzles arrangement.
5.	Bund wall along the container storage and washing area.
6.	Number of nozzles for 1 HP pump shall not exceed 03.
7.	Multiple jets to ensure that water jets hit entire inner surface of the containers.
8.	Separate area with provision for washing outer surface of the containers with periphery drainage, adequate slope and collection pit and channelizing to ETP.
9.	Effluent Treatment Plant and/or Forced Evaporator of adequate capacity
10.	Sludge drying Bed of adequate size
11.	Zero discharge by evaporation of the effluent and/ or recycling of treated effluent

	in washing process or member of Common Effluent Treatment Plant
12.	Water flow meter at the inlet to evaporator and ETP.
13.	Vent of vacuum pump (if any) elevated at least up to 6 mtr above the roof level.
14.	Separate covered hazardous waste storage area to store hazardous waste generated during the utilization process viz. left over residues from contained drums, residue from forced evaporator and ETP sludge.

4.13 Utilization of Process Sludge and Primary Sludge of ETP

This SoP is applicable only for utilization of Process Sludge & Primary Sludge of ETP as described below:

Type of HW	Source of generation	Recovery/Product
Process and primary sludge of ETP – Pulp and Paper	Paper & Pulp Industry	Paper Board/ Mill Board / Card Board

The utilization of waste pulp from process sludge & primary sludge from ETP of Pulp & Paper Industry to produce Paper board/Mill board shall involve any of the following steps;

(a) Dewatered primary ETP Sludge → mix waste pulp from process along with recycled water in mixer→ pressing & cutting in Board Machine → sun drying → Paper Board/Card Board/Sun Dry Paper Board.

Or

(b) Beating of paddy/wheat straw/ jute bag→ mix with primary ETP sludge in mechanical agitator along with recycled water → pressing & cutting in board machine → sun drying → Paper Board/Card Board/Sun Dry Paper Board.

A. <u>Standard Operating Procedure</u>

(1) Collection Storage & Handling of Process and primary sludge of ETP of Pulp & Paper industry

- The dewatered primary ETP Sludge & Process Sludge shall be procured in trucks/ trolleys.
- The unit shall store the primary ETP Sludge & Process Sludge in covered storage shed(s) within premises, so as to eliminate rain water intrusion. Further, the sheds shall have proper slope and spillage collection pit so as collect spillages/floor washings. The collected spillages/floor washings shall be channelized to Effluent Treatment Plant for their treatment/recycling.
- Transportation of primary ETP Sludge & Process Sludge shall be carried out by sender or receiver (utilizer) after obtaining authorisation from the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

- It shall be ensured that primary ETP Sludge & Process Sludge is procured from the industries who have valid authorization for the same from the concerned SPCB as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(2) Use of secondary ETP sludge generated from Pulp & Paper Industry is not permitted.

(3) Handling/transfer of primary ETP Sludge & Process Sludge is required to be done using mechanized system (such as trolley, loader, etc.).

(4) The entire process area shall have boundary wall or fencing with proper slope, periphery drainage and collection pit followed by channelization to Effluent Treatment Plant for treatment. Sun drying of board shall be done within the premises.

(5) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(6) The effluent generated during the utilization process shall be recycled back to beater/pulper ensuring zero liquid discharge, else the treated wastewater generated shall meet wastewater discharge standards stipulated in the consent issued by concerned SPCB.

(7) The monitoring of the effluent for the parameters specified in the Consent issued by the concerned SPCB shall be carried out quarterly through NABL/EPA accredited laboratory and report shall be submitted quarterly to the concerned the SPCB.

(8) The unit shall submit quarterly and annual information on quantity of ETP Sludge & Process sludge procured & utilized and its source, quantity of waste water generated, treated & recycled or resources conserved (specifying the details like type and quantity of resources conserved) to the concerned SPCB.

(9) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of Process sludge & Primary Sludge (of pulp & paper industry) shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(10) The unit shall maintain record of Process sludge & Primary Sludge utilised, residues 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 SPCB.

(11) A log book with information on source of procurement, quantity, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its

disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(12) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.

(13) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S. No	Requisite Facilities
1.	Storage shed(s) for dewatered primary ETP Sludge & waste pulp (Process sludge) of adequate size to store 7 days of consumption
2.	Beater/Mechanical Agitator/Mixer
3.	Board Machine with stainer mesh and roller press
4.	Mechanized handling system for Process Sludge & ETP Sludge
5.	Fencing/ boundary wall around the drying area
6.	Provision for collection and transfer of spillage water to ETP or for recycling

4.14 Utilization of Aluminium Dross (Captive)

This SoP is applicable only for utilization of Aluminium Dross as described below:

Type of HW	Source of generation	Recovery/Product
Aluminium Dross	Refining and casting house of Aluminium smelter units	To recover aluminium metal (captive use)

The utilization process shall involve crushing of aluminium dross in a crusher followed by screening to recover > 1mm and < 20mm size metal rich granules. These rich granules are melted in a crucible furnace to recover molten metal.

A. Standard Operating Procedure

(1) In-house transportation & handling of Aluminium dross shall be carried out using covered truck.

(2) The material shall be collected and stored under covered shed.

(3) Crushing and screening units shall be enclosed in a chamber connected to air pollution control devices comprising of cyclone dust collector and bag filter. The treated gases are routed to main flue gas duct of smelter pot-lines or anode baking units leading to FTP for control of fluoride emissions.

(4) The furnace shall be enclosed completely with shutters at the front side to enable charging and material retrieval operations. It shall be ensured that fume extractions systems are operated continuously during firing, charging and retrieval operations of the furnace.

(5) The flue gases containing combustion emission alongwith gases from furnace shall be extracted through ID fan and mixed with main duct carrying flue gases from smelters pot-line or anode baking unit for treatment in Fume Treatment Plant (FTP).

(6) If required, the furnace shall be fitted with a blower fan to supply the combustion air.

(7) A mechanical mixer shall be installed, to mix the molten material in crucible remotely while the firing in progress.

(8) There should be a provision for inspection window with glass lenses to inspect the interior portion of the furnace during firing and mixing operations.

(9) The furnace should be operated at a temperature of around 700 ^{0}C.

(10) Coke / Pet coke / hard coke or any other conventional fuels may be used for heating the furnace.

(11) The storage and handling material shall be done under a shed and over lined impervious flooring.

(12) The handling of hazardous waste shall be carried out using mechanical means with minimal manual intervention.

(13) The reject from screens, flue dust from cyclone & bag filters, and residue/dross from furnace shall be packed and temporarily stored in dedicated hazardous waste storage pit with cover and disposed in common hazardous waste treatment, storage and disposal facility within 90 days.

(14) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(15) The unit shall comply with following standards:

- *Source Emission Standards-*

(i) Total Fluoride, in the vent of Bag filters attached to crusher & screening unit shall not exceed 25 mg/Nm^3 or as stipulated by concerned SPCB, whichever is low.

(ii) Particulate Matter, in the vent of Bag filters attached to crusher & screening unit shall not exceed 150 mg/Nm^3 or as stipulated by concerned SPCB, whichever is low.

(iii) The emission in stack connected with FTP unit shall comply with the notified emission standards for anode baking unit or smelter units.

- *Work Zone standards (OSHA)* –
  PM_{10} - 5000 micrograms /m^3 TWA*
  Ammonia - 25 ppm (18 mg/m^3) TWA*
  Fluoride - 2.5 mg/m^3TWA*
  Cyanide - 5 mg/m^3TWA*

  * 8 hour T*ime-weighted average (TWA),*

(16) Monitoring of the specified parameters for source and work zone emissions shall be carried out by NABL/EPA accredited laboratories quarterly and the results shall be submitted to the concerned SPCB quarterly.

(17) The unit shall obtain authorization from the concerned State Pollution Control Board under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, for generation, storage and processing of aluminium dross.

(18) 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 SPCB.

(19) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(20) A log book with information on date of generation of aluminium dross, quantity, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(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 unit 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) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S. No.	Requisite Facilities
1.	Covered storage shed(s), of adequate capacity shall be provided to store aluminium dross as well as hazardous waste. Size of said sheds shall be adequate to store a quantity equivalent to one month's utilization of aluminium dross and 90 days of generation hazardous wastes respectively.
2.	Covered sheds for process operations including material handling.

3.	Crucible furnace made of cast iron or any other suitable material to operate at a temperature around 700 ^{0}C.
4.	A blower unit may be installed for supplying combustion air to the furnace.
5.	Use of Coke / hard coke / pet coke or any other conventional fuels for heating the furnace.
6.	There should an enclosure around the furnace with suction hood at the top connected to air pollution control devices. A provision of shutters shall be made at front side to enable charging, material retrieval and other operations.
7.	May install mechanical stirrer with provision for remote operation.
8	The Pulveriser, crusher and screening units shall be connected to air pollution control devices comprising of cyclone dust collector and bag filter with pulse jet cleaning.
9.	The cleaned gases from Pulveriser, crusher and screening units shall be sent to FTP unit of anode baking or smelter units for treatment of fluoride emissions.
10.	The flue gases generated form crucible furnace including the combustion emissions shall be sent to FTP unit of anode baking unit or smelter unit for treatment of fluoride emissions.
11.	Dumpers, loaders, feeders and other equipment for mechanical handling of aluminium dross and its residues.

4.15 Utilization of Aluminium Dross

This SoP is applicable only for utilization of Aluminium Dross as described below:

Type of HW	Source of generation	Recovery/Product
Aluminium Dross	Refining and casting house of Aluminium smelter units	To recover aluminium metal

The utilization process shall involve pulverising aluminium dross using crushers, pulverisers and mechanical screens to recover > 0.5mm and <20mm size metal rich granules. These rich granules are melted in a crucible furnace to recover molten metal.

A. Standard Operating Procedure

(1) Aluminium dross shall be procured in trucks and un-loaded in covered sheds to avoid contact with any moisture.

(2) The storage and handling material should be done under a shed and over lined impervious flooring.

(3) The handling of hazardous waste such as unloading, storage and transfer shall be carried out using mechanical means with minimal manual intervention.

(4) Crushing, pulverising and screening units shall be enclosed and connected to air pollution control devices comprising of cyclone dust collector, bag filter and alkali

scrubber and attached to stack. A combination of crusher, pulveriser and screening units with common air pollution control devices may be used.

(5) The furnace shall be enclosed completely with shutters at the front side to enable charging and material retrieval operations. It shall be ensured that fume extractions systems are operated continuously during firing, charging and retrieval operations of the furnace.

(6) The flue gases containing combustion emission and gases from furnace shall be extracted through ID fan and routed to wet alkali scrubber connected to a stack of height atleast 06 meter above the roof level of the process shed or the adjoining structure or as prescribed by SPCB whichever is higher.

(7) If required, the furnace shall be fitted with a blower fan to supply the combustion air.

(8) A mechanical mixer may be installed, to mix the molten material in crucible.

(9) The furnace should be operated at a temperature of around 700^0C.

(10) Coke / hard coke or any other conventional fuels may be used for heating the furnace.

(11) The reject from screens, flue dust from cyclone & bag filters, sludge from scrubber and residue/dross from furnace shall be packed and temporarily stored in dedicated hazardous waste storage pit with cover and disposed in common hazardous waste treatment, storage and disposal facility within 90 days.

(12) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(13) The unit shall comply with following standards:

Source Emission Standards-

(i) Total Fluoride, in stacks attached to the Crushing, pulverising and screening units and crucible furnace shall not exceed 25 mg/Nm^3 or as stipulated by concerned SPCB, whichever is low.

(ii) Particulate Matter, in stack attached to Crushing, pulverising and screening units and crucible furnace shall not exceed 150 mg/Nm^3 or as stipulated by concerned SPCB, whichever is low.

Work Zone standards (OSHA) –

PM_{10}	-	5000 microgram/m^3 TWA*
Ammonia	-	25 ppm (18 mg/m^3) TWA*
Fluoride	-	2.5 mg/m^3TWA*
Cyanide	-	5 mg/m^3TWA*

* 8 hour T*ime-weighted average (TWA),*

(14) Monitoring of the specified parameters for source and work zone emissions shall be carried out by NABL/EPA accredited laboratories quarterly and the results shall be submitted to the concerned SPCB quarterly.

(15) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of aluminium dross shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(16) Transportation of the hazardous wastes (i.e. Aluminium dross) and residues generated during utilisation process shall be carried out by sender or receiver (utilizer/TSDF operator) as per authorisation issued by the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(17) It shall be ensured that the aforesaid hazardous waste is procured from the Aluminium Smelter units who have valid authorization for the same from the concerned SPCB as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(18) 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.

(19) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(20) A log book with information on source of procurement, quantity, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(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 unit 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) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S. No.	Requisite Facilities
1.	Covered sheds for process operations including material handling. The sheds

	should prevent entry of any moisture/rain water during monsoon.
2.	Covered storage shed of adequate capacity shall be provided to store aluminium dross. The size of shed shall be adequate to store atleast 1 month quantity of utilization.
3.	Covered storage shed(s), of adequate capacity shall be provided to temporarily store scrubber sludge, residues and rejects. Size of shed shall be adequate to store at least 90 days of waste generation
4.	Crucible furnace made of cast iron or any other suitable material to operate at a temperature around 700^0C.
5.	A blower unit may be installed for supplying combustion air to the furnace.
6.	Coke / hard coke or any other conventional fuels maybe used for heating the furnace.
7.	There should an enclosure around the furnace with suction hood at the top connected to air pollution control devices. A provision of shutters shall be made at front side to enable charging, material retrieval and other operations.
8	May install mechanical stirrer to mix molten metal inside the crucible.
9.	The Pulveriser, crusher and screening units shall be connected to air pollution control devices comprising of cyclone dust collector and bag filter with pulse jet cleaning followed by alkali scrubber.
10.	The stack attached to Pulveriser, crusher and screening units shall be of 6 meters above the roof level of the adjoining structure or as specified in CTO issued by SPCB whichever is higher.
11.	The flue gases generated form crucible furnace including the combustion emissions shall be treated in wet alkali scrubber and the cleaned gases shall be vented through stack of height 6 meters above the roof level of the adjoining structure or as specified in CTO issued by SPCB whichever is higher.
12.	Dumpers, loaders, feeders and other equipment shall be used for mechanical handling of hazardous waste.

4.16 Utilization of Oil based iron sludge

This SoP is applicable only for utilization of oil based iron sludge as described below:

Type of HW	Source of generation	Recovery/Product
Oil based iron sludge	Grinding mill section of Ball & Roller bearings	Ferrous Sulphate

The utilization process shall involve reaction of Oil based iron sludge with 70% Sulphuric Acid in an acid proof reactor with continuous stirring with the help of mechanical stirrer followed by filter press, crystallization and drying to obtain Ferrous Sulphate Hepta-hydrate ($FeSO_4.7H_2O$).

A. Standard Operating Procedure

(1) The oil based iron sludge shall be procured in HDPE bags/ drums.

(2) Sulphuric acid shall restored in a lined tank above the ground with low raise bund wall & acid proof floor with slope to collect spillages into collection pit.

(3) Oil based iron sludge shall be stored on impervious acid proof floor with slope to collect seepage if any to collection pit. Entire process area shall have leak-proof and acid proof floor tiles.

(4) The spillages from collection pit shall be transferred to ETP, as the cases may be, through chemical process pump.

(5) There shall be no manual handling of oil based iron sludge and acids. The acid shall be transferred using chemical process pump.

(6) The reaction vessel shall be connected with suction hood above the feeding point (of Sulphuric acid) to control acid fume/vapour liberated from the reaction vessel. The suction hood shall be connected with alkali scrubber and stack.

(7) The treated acid fume/vapour shall be dispersed through stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB, whichever is higher.

(8) Sources of wastewater generation may be

a) Spent mother liquor (generated after numbers of recycling of mother liquor)
b) Scrubber bleed
c) Floor washing/reactor wash/vehicle wash/spillages, etc.

The above wastewater shall be treated in an ETP comprising of collection tank , Oil & grease trap, neutralization tank, flash mixer with provision for dosing with Poly electrolyte & Alum, settling tank and sludge handling facility. The treated water shall be recycled so as to meet zero discharge conditions or applicable discharge standards, in case discharge has been permitted by the concerned SPCB.

(9) The hazardous waste (viz. Oil from Reaction Tank, Filter Press Residue, ETP Sludge, Oil & grease and residue from scrubber, etc) generated from utilization process shall be packaged and temporarily stored in HDPE bags/drums under a dedicated hazardous waste storage area within the unit premise and disposed in common hazardous waste treatment, storage and disposal facility within 90 days.

(10) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(11) The Ferrous Sulphate Hepta-hydrate (FeSO4.7H2O). manufactured of utilizing aforesaid hazardous waste shall not be used in drinking water purification or agriculture applications and the same shall be used only for industrial purposes. The unit shall, therefore, label the product i.e. Ferrous Sulphate (FeSO4) as "*not be*

utilized for drinking water purification or agriculture applications and to be used only for industrial purposes".

(12) The unit shall comply with following standards:

- *Source Emission Standards-*

Sulphuric Acid Mist in stack attached to Reaction tank - 30 mg/Nm^3.

- *Work Zone standards –*

Sulphuric acid – 0.1 mg/m^3 TWA*, *3 mg/m^3 STEL**

* T*ime-weighted average (TWA), Short-term exposure limits (STEL). The Permissible Exposure Limit is 8-hour TWA.*
A short-term exposure limit (STEL) is the acceptable average exposure over a short period of time, usually 15 minutes as long as the Time weighted average is not exceeded. 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.

(13) Monitoring of the specified parameters for source and work zone emissions shall be carried out by NABL/EPA accredited laboratories quarterly and the results shall be submitted to the concerned SPCB quarterly.

(14) Transportation of the hazardous wastes (i.e. Oil based iron sludge) and residues generated during utilisation process shall be carried out by sender or receiver (utilizer/TSDF operator) as per authorisation issued by the concerned SPCB under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(15) It shall be ensured that the aforesaid hazardous waste is procured from the industries who have valid authorization for the same from the concerned State Pollution Control Board as required under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(16) 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 SPCB.

(17) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of oil based iron sludge shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(18) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(19) A log book with information on source of procurement, quantity, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its

disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(20) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.

(21) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S. No.	Requisite Facilities
1.	Storage shed for storage of Oil based iron sludge with acid proof impervious flooring.
2.	Size of the said storage shed to be adequate to store at least one week requirement of the Oil based iron sludge
3.	Rubber lined storage tank for Sulphuric acid above the ground with low raise bund wall & acid proof floor with slope to collect spillages into collection pit.
4.	Oil based iron sludge shall be stored on impervious acid proof floor with slope to collect seepage if any to collection pit.
5.	Mechanical means for transferring of acids/liquid chemicals to the reaction vessels
6.	The entire process area alongwith reaction tank shall be made of leak-proof and acid proof tiles with adequate slope to collect spillages if any into collection pit.
7.	Collection pit for collection of spillages from aforesaid working area and unloading area.
8.	Reaction tank of adequate capacity
9.	Hood over all reaction vessels with proper acid proof ducting material maintaining suction and attached to scrubber and stack
10.	Facility for preparation of alkaline medium (for use in scrubber) and its storage tank
11.	Stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB, whichever is higher. Stack shall have easy access to port hole for conducting stack monitoring
12.	Filter press

13.	Crystallizer
14.	Drying platform or hot air dryer for drying Ferrous Sulphate crystals connected to scrubber and stack
15.	Effluent treatment plant comprising of collection tank, Oil & Grease trap, neutralization tank, flash mixer with provision for dosing with Poly electrolyte & Alum, settling tank settling tank and sludge handling facility.
16.	Covered hazardous waste storage area to store residue generated during utilization viz. Oil & grease, Acid containing sludge and ETP sludge.

4.17 Utilization of Spent catalyst containing Mercury & Mercury Waste

This SoP is applicable only for utilization of Spent catalyst - Containing Mercury and mercury waste as described below:

Type of HW	Source of generation	Recovery/Product
Spent catalyst - Containing Mercury and mercury waste	Various industry	Mercury

The utilization process shall involve heating of Spent catalyst containing Mercury (impregnated in activated carbon) in vacuum furnace and heated upto 400 ^{0}C for 48-72 hours using coal as fuel. Mercuric compound in the Spent Catalyst is disintegrated and mercury vapours are released. The mercury vapours generated are condensed in water cooled condenser and converted to liquid mercury which is packed in MS bottles.

A. Standard Operating Procedure

(1) Spent catalyst - Containing Mercury and mercury waste shall be recived in HDPE bags/drums

(2) Spent catalyst - Containing Mercury and mercury waste shall be received and stored under covered shed with ventilation

(3) There shall be no manual handling of the Spent catalyst - Containing Mercury and mercury waste, residues, chemicals etc. The same shall be handled mechanically ensuring that there is no spillage or pilferages around the process area.

(4) The entire process area shall have impervious floor.

(5) Spent catalyst - Containing Mercury and mercury waste is heated in a closed vessel using conventional fuels. The flue gases from furnace shall be passed through water cooled condenser to recover liquid mercury. The condensate water shall be re-circulated through a cooling circuit (Cooling Tower/Refrigeration unit/other cooling arrangement). The waste shall be heated at a temperature of 300°C - 450°C.

(6) The flue gas after condenser shall be treated in scrubber using Sodium Sulphide solution so as to meet standards prescribed by the SPCB or CPCB, whichever is lower. The height of the stack (attached to the said scrubber) shall be 30 meter from ground or as prescribed by the concerned SPCB, whichever is higher.

(7) The combustion emission from the heating shall be connected to scrubber.

(8) The scrubbed liquor viz. Sodium Sulphide solution shall be re-circulated through a collection-cum-settling tank. The settled sludge from the recirculation tank shall be sent to sludge drying bed and finally be sent for disposal into common hazardous waste treatment, storage & disposal facility.

(9) The bleed water from scrubber shall be sent to solar evaporation pan and dried residue shall be sent for disposal into common hazardous waste treatment, storage & disposal facility.

(10) There shall no waste water discharge.

(11) The hazardous waste (viz. furnace residue, sludge and solar evaporation residue etc.) generated from utilization process shall be packaged and temporarily stored in a dedicated hazardous waste storage area within the unit premise and be sent for disposal in common hazardous waste treatment, storage and disposal facility within 90 days.

(12) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(13) The unit shall comply with following standards:

- *Stack emission standards* -
  Particulate Matter – 50 mg/Nm^3 or as stipulated by SPCB, whichever is lower;
  Mercury & its compounds – 0.05 mg/Nm^3 or as stipulated by SPCB, whichever is lower.

- *Work Zone standards* –

  PM_{10} - 5 mg/m^3 TWA*
  Mercury - 0.1 mg/m^3 Ceiling limit

  ** Time-weighted average (TWA), The Permissible Exposure Limit is 8-hour TWA. 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.*

(14) Monitoring of the specified parameters for source and work zone emissions as well as aforesaid effluent shall be carried out by NABL/EPA accredited laboratories quarterly and the results shall be submitted to the concerned SPCB quarterly.

(15) Transportation of the aforesaid hazardous wastes (i.e. Spent catalyst containing Mercury & Mercury Waste) and residues generated during utilisation process shall be carried out by sender or receiver (utilizer/TSDF operator) as per authorisation issued by the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.

(16) It shall be ensured that the Spent catalyst containing Mercury & Mercury Waste is procured from the industries who have valid authorization for the same from the concerned SPCB as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016

(17) 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 SPCB.

(18) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of Spent catalyst containing Mercury & Mercury waste shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(19) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(20) A log book with information on source, quantity and date of procurement, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(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 unit 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) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
1.	Storage shed for storage of Spent catalyst containing Mercury & Mercury Waste. The shed shall have impervious flooring and well ventilated.
2.	Size of the Spent catalyst containing Mercury & Mercury Waste shall have minimum capacity of at least one week requirement l
3.	Heating vessel along with Mercury Condenser
4.	Cooling circuit for recirculation of condensate water through Cooling Tower/Refrigeration unit/other cooling arrangement.

5.	Facility for Mercury collection in MS Bottles
6.	Scrubber with arrangement of re-circulation of scrubbing medium (Sodium Sulphide Solution) through a collection-cum-settling tank
7.	Stack (attached to the said scrubber) of height 30 meter from ground or as prescribed by the concerned SPCB, whichever is higher.
8.	impervious floor in the entire process area
9.	Solar Evaporation pan of adequate size
10.	Sludge Drying Bed for scrubber residue
11.	Hazardous waste (i.e. furnace residue, sludge and solar evaporation residue etc.) shall be collected in HDPE bags/drums and stored under covered storage area

4.18 Utilization of Spent H_2SO_4 containing organic compounds

This SoP is applicable only for utilization of Spent acid - Containing H_2SO_4 as described below:

Type of HW	Source of generation	Recovery/Product
Spent H_2SO_4 containing organic compounds	Dyes and Dyes intermediates units	Chemical Gypsum for use in cement plants

The utilization process shall involve neutralization of Spent H_2SO_4 containing organic compounds with limestone slurry and then hydrated lime slurry followed by filtration to obtain Chemical gypsum. Typically, 500 tons of Spent Sulphuric acid (20%) is neutralized by about135 tons of limestone (80%) and about 04 tons of hydrated lime (90%) respectively which result into about 252 tons of chemical gypsum (78%). The chemical gypsum is sent to cement plants for use in cement plants and the wastewater generated is sent for further treatment in CETP.

A. Standard Operating Procedure

(1) Spent H_2SO_4 containing organic compounds shall be received in acid proof tankers / HDPE drums to an earmarked unloading area (where Spent Sulphuric acid is transferred from tanker to storage tank). The storage tank shall be placed above the ground with low raise bund wall & acid proof floor with slope to collect spillages, if any, to collection pit.

(2) Entire process area shall have leak-proof and acid proof floor tiles with adequate slope to collect spillages, if any, into a collection pit. Alternatively, storage tanks for Spent Sulphuric acid may be below the ground provided it has HDPE liner system beneath the tank and leachate collection system below HDPE liner. In the event of leachate detection in the leachate collection system, corrective measures shall be taken immediately.

(3) The spillages from collection pit shall be transferred to ETP or neutralization tank, as the cases may be, through chemical process pump.

(4) A vent from Spent Sulphuric acid storage tanks shall be connected to scrubber for treatment using alkaline scrubber.

(5) There shall be no manual handling of Spent H_2SO_4 containing organic compounds. Chemical process pump shall be used for transfer to neutralization tanks.

(6) Acid fume/vapour is expected to be liberated from the neutralization tanks where limestone/ hydrated lime slurry are added to Spent Sulphuric acid. Therefore, suction hood and ducts shall be placed above the neutralization tanks to collect acidic fume/vapour for treatment in alkali scrubber.

(7) The treated acid fume/vapour shall comply with emission norms and shall be dispersed into atmosphere through stack of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB, whichever is higher.

(8) The resultant reaction mass from neutralization tank shall be conveyed through slurry pumps to Filter Press where chemical gypsum is produced as filter cake.

(9) The high TDS/Chloride effluent from neutralization followed by filter press be treated in Reverse Osmosis (RO) followed by Multi Effect Evaporator (MEE) and the permeate and condensate from RO and MEE respectively shall be reused in the process. Alternatively, SPCB may permit other treatment or disposal through CETP if available only after assessing suitability of high TDS/Chloride in the inlet of CETP.

(10) The chemical gypsum shall be stored in covered storage sheds ensuring no proliferation of rain water into it. The floor of the storage shed shall have proper slope to collect leachate, if any, and collection pit. The leachate from the collection pit shall be transferred to ETP or reaction tank, as the cases may be, through chemical process pump.

(11) Limestone and hydrated lime shall also be stored in covered storage sheds with similar provisions as above.

(12) Automated mechanised system for loading limestone and hydrated lime into silos equipped with bag filters for conveying into slurry preparation tanks. Bag filters shall have vent of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB, whichever is higher. The vent shall have easy access to port hole for conducting stack monitoring.

(13) The unit shall ensure that all personnel involved in the plant operation shall wear proper personal protective equipment such as masks, safety gloves, goggles, safety shoes etc.

(14) The chemical gypsum produced from utilizing Spent H_2SO_4 containing organic compounds shall be sent to cement manufacturing units having authorisation utilise the same under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(15) The unit shall comply with following standards:

- *Source Emission Standards-*

(i) Sulphuric Acid Mist in stack, attached to Neutralization Tanks and Spent Acid Storage Tanks, shall not exceed 50 mg/Nm^3 or as stipulated by Gujarat Pollution Control Board, whichever is low.

(ii) Particulate Matter, in the vent of Bag filters connected to lime stone and hydrated lime preparation silos, shall not exceed 150 mg/Nm^3 or as stipulated by Gujarat Pollution Control Board, whichever is low.

- *Work Zone standards* –

  Sulphuric acid - 0.1 mg/m3 TWA*, 3 mg/m3 STEL*
  PM_{10} - 5 mg/m^3 TWA*

  * Time-weighted average (TWA), Short-term exposure limits (STEL). The Permissible Exposure Limit is 8-hour TWA.

A short-term exposure limit (STEL) is the acceptable average exposure over a short period of time, usually 15 minutes as long as the Time weighted average is not exceeded.
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.

(16) Monitoring of the specified parameters for source and work zone emissions shall be carried out by NABL/EPA accredited laboratories quarterly and the results shall be submitted to the concerned SPCB quarterly.

(17) Transportation of the hazardous wastes (i.e. Spent H_2SO_4 containing organic compounds) and chemical gypsum shall be carried out by sender or receiver (utilizer /cement industry) in a tanker/trucks as per the authorisation issued by the concerned SPCB under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(18) It shall be ensured that the aforesaid hazardous waste is procured from the industries who have valid authorization for the same from the concerned SPCB as required under the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

(19) 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.

(20) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of Spent H_2SO_4 containing organic compounds shall be entered:

- Address of the sender
- Date of dispatch
- Quantity procured
- Seal and signature of the sender
- Date of receipt in the premises

(21) The unit shall maintain record of hazardous waste utilised, residues 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 SPCB.

(22) A log book with information on source of procurement, quantity, date wise utilization of the same, quantity of products manufactured, hazardous waste generation and its disposal etc. shall be maintained including analysis report of emission monitoring & effluent discharged, as applicable.

(23) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.

(24) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

B. Checklist of Minimal Requisite Facilities

S.No	Requisite Facilities
1.	Spent Acid Storage tank(s), of adequate capacity to store Spent H_2SO_4 containing organic compounds. Size of said tank (s) shall be adequate to store at least one week requirement of the said hazardous wastes to be used as raw material. Vent of Spent Sulphuric acid storage tanks shall be connected to alkali scrubber.
2.	Earmarked unloading area (for transfer of Spent Sulphuric acid from tanker) contained with low raise bund wall & acid proof floor with slope to collect spillages, if any, to collection pit.
3.	Covered storage shed, having capacity to store minimum of seven days utilization capacity.
4.	The floor of the storage shed shall have proper slope to collect leachate, if any, and collection pit. Chemical process pumps to transfer leachate from the collection pit to ETP / reaction tank.
5.	Separate covered storage sheds for storage of Limestone and hydrated lime of seven days capacity.
6.	Chemical process pumps to transfer Spent Sulphuric acid from storage tank to reaction tank.
7.	Slurry preparation tank(s) with automated mechanised system for loading limestone and hydrated lime through silos equipped with bag filters. Bag filters to have vent of minimum height of 06 m above the roof top or as prescribed by the concerned SPCB, whichever is higher. The vent shall have easy access to port hole for conducting stack monitoring.
8.	Acid proof neutralization tank of adequate capacity with mechanical agitator along with hood for suction of acid fumes/ mist from the reaction tank and channelizing to

	scrubber
9.	Scrubber followed by stack of minimum height of 6 m above the roof top or as prescribed by the concerned SPCBs/PCCs, whichever is higher. Stack shall have easy access to port hole for conducting stack monitoring
10.	Facility for preparation of alkaline medium (for use in scrubber) and its storage tank
11.	The entire working area along reaction tank to be made of leak-proof and acid proof floor tiles with adequate slope to collect spillages, if any, into a collection pit.
12.	Slurry pumps to transfer resultant reaction mass from neutralization tank to Filter Press.
13.	Filter press
14.	Reverse Osmosis (RO) followed by Multi Effect Evaporator (MEE) for treatment of the high TDS/Chloride effluent (about 850 KLD) or other requisite facilities as permitted by SPCB

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Annexure –I

MINISTRY OF ENVIRONMENT, FOREST AND CLIMATE CHANGE

NOTIFICATION

New Delhi, the 10th May, 2016

G.S.R. 497 (E). – In exercise of powers conferred by sections 6 and 25 of the Environment (Protection) Act, 1986 (29 of 1986), the Central Government hereby makes the following rules further to amend the Environment (Protection) Rules, 1986, namely :-

1. Short title and commencement - (1) These rules may be called the Environment (Protection) Third Amendment Rules, 2016.

   (2) They shall come into force on the date of their publication in the Official Gazette.

2. In the Environment (Protection) Rules, 1986,-

   (a) in schedule I, after serial number 10 and the entries relating thereto, the following serial number and entries shall be inserted, namely:-

"S. No.	Industry	Parameter	Standards		
(1)	(2)	(3)	(4)		
"10A.	Cement Plant with co-processing of wastes	A- Emission Standards			
		Rotary Kiln – with co-processing of Wastes			
			Date of Commissioning	**Location**	**Concentration not to exceed, in mg/Nm^3**
			(a)	(b)	(c)
		Particulate Matter (PM)*	on or after the date of notification (25.8.2014)	anywhere in the country	30
			before the date of notification (25.8.2014)	critically polluted area or urban centres with population above 1.0 lakh or within its periphery of 5.0 kilometer radius	30
				other than critically polluted area or urban centres	30
		SO_2*	irrespective of date of commissioning	anywhere in the country	100, 700 and 1000 when pyritic sulphur in the limestone is less than 0.25%, 0.25 to 0.5% and more than 0.5% respectively.
		NOx*	After the date of notification (25.8.2014)	anywhere in the country	(1) 600
			Before the date of notification	anywhere in the country	(2) 800 for rotary kiln with In Line Calciner

			(25.8.2014)		(ILC) technology. (3) 1000 for rotary kiln using mixed stream of ILC, Separate Line Calciner (SLC) and suspension pre-heater technology or SLC technology alone or without calciner.
		HCl		10 mg/Nm^3	
		HF		1 mg/Nm^3	
		TOC		10 mg/Nm^3 **	
		Hg and its compounds		0.05 mg/Nm^3	
		Cd +Tl and their compounds		0.05 mg/Nm^3	
		Sb+As+Pb+Co+Cr+Cu+Mn+Ni+V and their compounds		0.5 mg/Nm^3	
		Dioxins and Furans		0.1 ngTEQ/ Nm^3	
		Note: The abbreviations used in the Table shall mean as under: SO_2- Sulphur dioxide; NO_X - Oxides of Nitrogen; HCl – Hydrogen Chloride; HF – Hydrogen Flouride; TOC - Total Organic Carbon; Hg – Mercury; Cd – Cadmium; Tl – Thallium; Sb – Antimony; As – Arsenic; Pb – Lead; Co – Cobalt; Cr – Chromium; Cu – Copper; Mn – Manganese; Ni – Nickel; and V - Vanadium."; * The concentration values and timeline for implementation in respect of PM, SO_2 and NOx shall be governed in accordance with the provisions under notification published vide GSR No. 612 (E), dated the 25th August, 2014 and amended from time to time. **Permitting authority may prescribe separate standards on case to case basis, if Total Organic Carbon (TOC) does not result from the co-processing of waste. (a) The height of each individual stack connected to Kiln, Clinker Cooler, Cement Mill, Coal Mill, Raw Mill, Packaging section, etc. shall be of a minimum of 30 metres or, as per the formula H = 14 $(Q1)^{0.3}$ and H = 74 $(Q2)^{0.27}$ whichever is more, where "H" is the height of stack in metres and "Q1" is the maximum quantity of SO_2 expected to be emitted in kg/hr and "Q2" is the maximum quantity of PM expected to be emitted in tonnes/hr through the stack at 100 percent rated capacity of the plant; (b) The monitored values of SO_2, NO_x, HCl, HF, TOC, Metals and Dioxins and Furans at main kiln stack shall be corrected to 10% Oxygen, on dry basis and the norms for SO_2, NO_x, HCl, HF, TOC, Metals and Dioxins and Furans shall be applicable to main kiln stack and the norms for Particulate Matter (PM) shall be applicable to all the stacks in the plant. PM, SO_2, NO_x shall be monitored continuously. HCl, HF, TOC, Metals and Dioxins and Furans shall be monitored once in a year; (c) Scrubber meant for scrubbing emissions shall not be used as quencher and plants having separate stack for gaseous emission for the scrubbing unit, the height of this stack shall be at least equal to the main stack.			
		B- Service waste water (with co-processing of wastes) All efforts shall be made by the industry for 'zero discharge' of service wastewater and in case, the industry prefers to discharge service wastewater, the following norms shall be complied with:			
				Concentration not to exceed, milligram per litre (except pH and temperature)	
		pH		5.5 to 9.0	
		Suspended Solids		100	

		Oil and Grease	10
		Temperature	not more than 5°C higher than the intake water temperature
		C- Storm water (I) Storm-water shall not be allowed to mix with effluent, treated sewage, scrubber water and or or floor washings. (II) Storm-water within battery limits of industry shall be channelised through separate drain(s).".	

(b) in Schedule VI, under 'Part-D' relating to General Emission Standards, in item III relating to Load or Mass based standards, after serial number 10 and the entries relating thereto, the following serial number and entries shall be inserted, namely:-

(1)	(2)	(3)	(4)
"10A	Cement Plants (with co-processing)	Rotary kiln based plants (Particulate Matter from raw mill, kiln and pre-calciner system put together)	0.125 kg/ tonne of clinker.".

[F. No.- Q-15017/30/2007-CPW]

Dr. RASHID HASAN, Advisor

Note .- The principal rules were published in the Gazette of India, Extraordinary, Part II, Section 3,Sub-section (i), *vide* number S.O. 844 (E), dated the 19th November, 1986 and subsequently amended *vide* the following notifications, namely:-

S.O. 433 (E), dated the 18th April 1987; G.S.R. 176(E), dated the 2nd April, 1996; G.S.R. 97 (E), dated the 18th February, 2009; G.S.R. 149 (E), dated the 4th March , 2009; G.S.R. 543(E), dated the 22nd July,2009; G.S.R. 739 (E), dated the 9th September, 2010; G.S.R. 809(E), dated, the 4th October, 2010, G.S.R. 215 (E), dated the 15th March, 2011; G.S.R. 221(E), dated the 18th March, 2011; G.S.R. 354 (E), dated the 2nd May, 2011; G.S.R. 424 (E), dated the 1st June, 2011; G.S.R. 446 (E), dated the 13th June, 2011; G.S.R. 152 (E), dated the 16th March, 2012; G.S.R. 266(E), dated the 30th March, 2012; and G.S.R. 277 (E), dated the 31st March, 2012; and G.S.R. 820(E), dated the 9th November, 2012; G.S.R. 176 (E), dated the 18th March, 2013; G.S.R. 535(E), dated the 7th August, 2013; G.S.R. 771(E), dated the 11th December, 2013; G.S.R. 2(E), dated the 2nd January, 2014; G.S.R. 229 (E), dated the 28th March, 2014; G.S.R. 232(E), dated the 31st March, 2014; G.S.R. 325(E), dated the 07th May, 2014, G.S.R. 612, (E), dated the 25th August 2014; G.S.R. 789(E), dated the 11th November 2014; S.O. 3305(E), dated the 7th December, 2015; S.O.4(E), dated the 1st January 2016; G.S.R. 35(E), dated the 14th January 2016 and lastly amended vide notification G.S.R. 281 (E), dated the 7th March, 2016.

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