

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

HSPCB/HWM/2021/ Dated: 10/05/2021

To

1. All the Branch Incharges.
2. All the Regional Officers.

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

Please find enclosed herewith a copy of letter No. B-29016/(G-66)/21/WM-II Div./AR/17039 dated 09.04.2021 received from Central Pollution Control Board, Delhi regarding the 03 new SoPs for utilization of hazardous waste for information and further necessary action:-

- i. 62nd SoP for Utilization of ETP Sludge (generated from pickling process of stainless steel of various grades) (Hazardous Waste Category 13.2 of Schedule-I of HOWM Rules, 2016) for manufacturing of Red Oxide, Nickel Oxide, Chromium Oxide, Calcium Sulphate or Gypsum (to manufacture Paver Blocks).
- ii. 63rd SoP for Utilization of Dilute Acetic Acid (generated from Manufacturing of Pharmaceutical/Pesticide/ Chemical Industry) (Hazardous Waste Category Cat26.3/ 29.6 of Schedule-I and/or Schedule-II Class B 15 Inorganic acids of HOWM Rules, 2016) for manufacturing of Acetic Anhydride.
- iii. 64th SoP for Utilization of metal and metal bearing wastes (Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) (generated during smelting, cutting tools, plating droppings, melting pots, ordinance factory, scrap traders, etc.) (Hazardous Waste Category Basel No. B-1010, Part D of ScheduleIII of HOWM Rules, 2016) for recovery of metal salts/alloys.

DA/As above

C.C to : Sr. Environmental Engineer, IT Cell, HSPCB for uploading the above said SoPs for utilization of hazardous waste on the website of the Board.

DA/As above

I/38636/2021

Digitally signed by NAVEEN
GULIA
Date: Mon May 10 12:08:52 IST
2021
Reason: Approved

Sr. Environmental Engineer (HQ)
For Member Secretary



SPEED POST

F. No. B-29016/(G-66)/21/WM-II Div./AR 17039

March 17, 2021

To

The Member Secretary
Haryana Pollution Control Board
C-11, Sector-6
Panchkula, Haryana-134 109
Chandigarh

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

Sir,

The Central Pollution Control Board (CPCB) has developed 03 new SoPs for utilization of various hazardous waste as approved in 23rd meeting of TEC constituted by CPCB for evaluating the proposals for utilization of hazardous waste under Rule, 9 of HOWM Rules, 2016.

CPCB has already developed 61 Standard Operating Procedures (SoPs) for various types of hazardous waste utilization and all the SoPs are also available on CPCB website <https://cpcb.nic.in/sop-for-hw-specific/>.

Now, CPCB has developed 03 new SoPs for utilization of hazardous waste as given below:

- i. 62nd SoP for Utilization of ETP Sludge (generated from pickling process of stainless steel of various grades) (Hazardous Waste Category 13.2 of Schedule-I of HOWM Rules, 2016) for manufacturing of Red Oxide, Nickel Oxide, Chromium Oxide, Calcium Sulphate or Gypsum (to manufacture Paver Blocks).
- ii. 63rd SoP for Utilization of Dilute Acetic Acid (generated from Manufacturing of Pharmaceutical/Pesticide/ Chemical Industry) (Hazardous Waste Category Cat-26.3/ 29.6 of Schedule-I and/or Schedule-II Class B 15 Inorganic acids of HOWM Rules, 2016) for manufacturing of Acetic Anhydride.
- iii. 64th SoP for Utilization of metal and metal bearing wastes (Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) (generated during smelting, cutting tools, plating droppings, melting pots, ordinance factory, scrap traders, etc.) (Hazardous Waste Category Basel No. B-1010, Part D of Schedule-III of HOWM Rules, 2016) for recovery of metal salts/alloys.

It is requested to ensure that the authorisation shall be granted by the SPCBs/PCCs in accordance to the said SoPs and provisions under the HOWM Rules, 2016.

Yours faithfully,

(Abhey Singh Soni)

Additional Director & Head
Waste Management-II Division

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

**Utilization of ETP Sludge generated from Pickling Process as Resource material for
manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks)**



March, 2021

Central Pollution Control Board

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

Parivesh Bhawan, East Arjun Nagar,

Shahdara, Delhi – 110032

Utilization of ETP Sludge generated from Pickling Process as Resource material for manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks)

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

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

62.0 Utilization of ETP Sludge:

Type of HW	Source of generation	Recovery/Product
ETP Sludge (13.2 Schedule-I of HOWM Rules – 2016)	Generated from Pickling Process of Stainless steel of various grades.	Calcium Sulphate or Gypsum (To manufacture Paver Blocks), Red Oxide, Nickel Oxide, Chromium Oxide

Utilization of ETP Sludge generated from Pickling Process as Resource material for manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks)

62.1 Source of Waste:

ETP Sludge generated from pickling process of stainless steel is categorized as hazardous waste listed at 13.2 of Schedule-I of HWM Rules – 2016.

Table 1. Typical Characteristics of ETP Sludge generated from pickling process of stainless steel are given below:

Sl. No.	Parameter	Results	Unit
1.	pH	7.9	--
2.	Moisture	50	%
3.	Cr	1.76	%
4.	Fe	20.9	%
5.	Ni	0.67	%
6.	Mn	0.29	%
7.	F	56	mg/L

62.2 Utilization Process

First Stage: ETP Sludge is mixed with fresh water & H₂SO₄ and stirred into liquefied solution. The liquefied solution is passed through hydraulic filter press, where the solid part is retained in form of filter cake & filtrate – 1 is collected in the collection tank and processed in second stage. The filter cake is wet CaSO₄ (gypsum) and dried in muffle furnace to obtain dried CaSO₄ (gypsum), which contains substantial quantity of fluoride content. Fluoride content in dried CaSO₄ (gypsum) is minimized by using hot water washing method, in this method dried CaSO₄ (gypsum) is washed by addition of hot water followed by stirring. Fluoride salt in CaSO₄ reacts with hot water & form aqua hydro fluoride which is soluble in water. The liquefied solution is again passed through hydraulic filter press. CaSO₄ trapped in filter press along with CaO as filter cake and water with HF easily passes away and collected as filtrate. The filter cake (washed Gypsum) is collected and again dried in muffle furnace & grinded in ball mill to obtain fine consistency and it is used in paver block manufacturing as a binding agent. The Filtrate-2 (gypsum wash water) is collected separately and processed in second stage along with filtrate-1.

Second Stage: Filtrate - 1 & 2 from first stage is oxidized by addition of NaNO₂ and stirred in the agitated reaction vessel. Further, NaOH is added to increase the pH and stirred in the agitated reaction vessel. The liquefied solution is passed through hydraulic filter press where the solid part is retained in form of filter cake (Chromium & Iron) & filtrate-3 is collected in the collection tank and processed in third stage.

Third Stage: NaOH is added to the filtrate-3 (Nickel Sulphate solution) of second stage to increase the pH and stirred in the agitated reaction vessel. The liquefied solution is passed through hydraulic filter press where the solid part is retained in form of filter cake [Ni(OH)₂] & filtrate-4 (Na₂S₂O₄ solution) is collected in the collection tank and reused as cooling water in captive hot rolling mills or recycled in the same process.

Utilization of ETP Sludge generated from Pickling Process as Resource material for manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks)

Filter cake with 25-30% moisture (Chromium & Iron) of second stage is further processed by addition of Na_2CO_3 and stirred in the agitated reaction vessel. The liquefied solution ($[\text{Fe}(\text{OH})_3]$ & $\text{Na}_2\text{Cr}_2\text{O}_7$ mix solution) is further processed by addition of fresh water and stirred in the same agitated reaction vessel. The liquefied solution is passed through hydraulic filter press where solid part retained in form of filter cake $[\text{Fe}(\text{OH})_3]$ & filtrate-5 ($\text{Na}_2\text{Cr}_2\text{O}_7$ solution) is collected in the collection tank and processed in fourth stage. Filter cake $[\text{Fe}(\text{OH})_3]$ is collected and dried in the muffle furnace to obtain red oxide powder (value added by-product). Similarly, filter cake $[\text{Ni}(\text{OH})_2]$ of third stage is dried in the muffle furnace to obtain nickel oxide powder (value added by-product).

Fourth Stage: H_2SO_4 is added to the filtrate-5 ($\text{Na}_2\text{Cr}_2\text{O}_7$ solution) of third stage to decrease the pH and stirred, simultaneously NaNO_2 is added and stirred; further NaOH is added to increase the pH and stirred in the agitated reaction vessel. The liquefied solution is passed through hydraulic filter press where solid part retained in form of filter cake $[\text{Cr}(\text{OH})_3]$ & filtrate-6 ($\text{Na}_2\text{S}_2\text{O}_4$ solution) is collected in the collection tank and reused as cooling water in captive hot rolling mills or recycled in the same process. Filter cake $[\text{Cr}(\text{OH})_3]$ is collected and dried in the muffle furnace to obtain Chromium oxide powder (value added by-product).

Paver block manufacturing: Automatic or Manual Paver Manufacturing Machine is used to produce paver block from slag (from scrap steel refining), gypsum (recovered in above process), cement, grit and water. Composition of above ingredients may be based on strength required & application of manufactured paver blocks.

62.3 Product Usage / Utilization

Recovered Red Oxide to be used as pigment in industrial grade, and Gypsum will be utilized for manufacturing of Paver Blocks. The Products shall comply as per Bureau of Indian Standards (BIS) of further respective utilization. However the products manufactured utilizing the hazardous waste shall not be used in food and pharma industries.



Utilization of ETP Sludge generated from Pickling Process as Resource material for manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks)

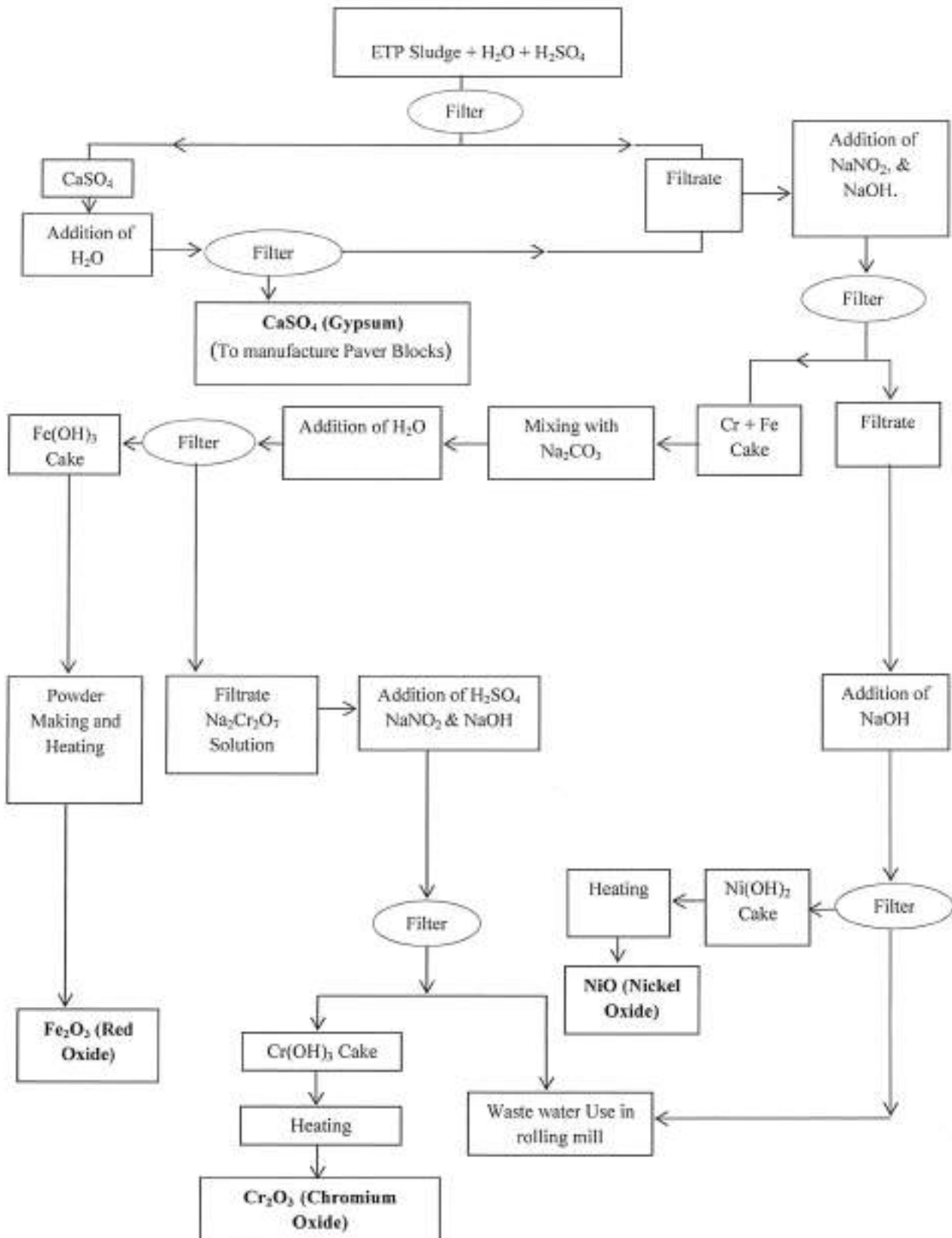


Figure: 1-Process flow diagram for utilization of hazardous waste.

Utilization of ETP Sludge generated from Pickling Process as Resource material for manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks)

62.4 Standard Operating Procedure for utilization

This SoP is applicable only for utilization of ETP Sludge generated from Pickling Process as Resource material for manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks).

- 1) ETP sludge shall be procured through vehicles fitted with requisite safeguards ensuring no leakage.
- 2) ETP sludge shall be stored in acid proof brick lined area under covered storage shed within premises so as to prevent rain water instruction. Further, storage sheds shall have proper slope and seepage collection pit to collect seepage / floor washing. The collected seepage / floor washing shall be channelized to Effluent Treatment Plant for further treatment.
- 3) Transfer of ETP sludge from storage sheds shall be carried out through covered trolley or mechanical conveyor.
- 4) The unit shall provide separate storage tanks for storage of chemicals and the storage tanks should be at designated place with proper cover and with acid brick lining floors.
- 5) The treated gases shall comply with emission norms prior to dispersion into atmosphere through stack. The height of stack shall be a minimum of 6 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher.
- 6) The unit shall maintain proper ventilation in the work zone and process areas. All personnel involved in the plant operation shall wear proper personal protective equipment (PPE) specific to the process operations involved and type of chemicals handled as per Material Safety Data Sheet (MSDS). The safety precautions of the worker shall be in accordance with the Factories Act, 1948, as amended from time to time.
- 7) Treatment and disposal of wastewater:
Wastewater generated from floor-washings, spillages, reactor washing, scrubber bleed including the wastewater from filtration shall be treated Physico-Chemically in an ETP or may be sent to CETP for final disposal or be treated further in a captive facility to comply with surface water discharge standards.
In case of zero discharge condition by SPCB/PCC, the treated waste water from ETP may be managed as per conditions stipulated by the SPCB/PCC.
- 8) The treated effluent shall be discharged in accordance with the conditions stipulated in the Consent to Operate issued by concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974.
- 9) Dryer and ball mill shall be attached with a cyclone/ bag filter with a stack of adequate height or as prescribed by the concerned SPCB/PCC, whichever is higher.
- 10) Unit shall ensure that recovered Gypsum which is to utilized in the manufacturing of Paver block shall meet the prescribed limits of Schedule-II of HOWM Rules- 2016.
- 11) The hazardous wastes generated (namely the Filter cake, other chemical sludge etc.) shall be collected and temporarily stored in non-reactive drums / bags under a dedicated hazardous waste storage area and be sent to authorized common TSDF or MEE or other authorized facility within 90 days from generation of the waste in accordance with the authorization issued by the concerned SPCB/PCC. Such storage area shall be covered with proper ventilation.



Utilization of ETP Sludge generated from Pickling Process as Resource material for manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks)

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

62.5 Record>Returns Filing

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



Utilization of ETP Sludge generated from Pickling Process as Resource material for manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks)

62.6 Standards

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

PM	:	150 mg/Nm ³
SO ₂	:	100 ppm
NO _x	:	50 ppm
HCl	:	50 mg/Nm ³
CO	:	100 mg/Nm ³

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

PM ₁₀	:	5 mg/m ³
Cl ₂	:	3 mg/m ³
HCl	:	7 mg/m ³
Acid Mist (H ₂ SO ₄)	:	1 mg/m ³

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

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

62.7 Siting of Industry

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

62.8 Size of Plant and Efficiency of Utilisation

100 kg ETP sludge was used for manufacturing 40 kg gypsum (CaSO₄) and 17 kg red oxide (Fe₂O₃). Hence, yield was 0.4 for gypsum (CaSO₄) & 0.17 Ferric oxide (Fe₂O₃). 8 Kg Chromium oxide (Cr₂O₃) & 5 Kg Nickel oxide (NiO) were also obtained as value added byproducts. Therefore, requisite facilities of adequate size of storage shed and other plants and machineries as given in para 62.10 given below shall be installed accordingly.

62.9 On-line Detectors / Alarms / Analyzers

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

Utilization of ETP Sludge generated from Pickling Process as Resource material for manufacturing of Red Oxide & Gypsum (To manufacture Paver Blocks)

62.10 Checklist of Minimal Requisite Facilities

S. No	Particulars
1.	Covered Hazardous Waste storage area for storage of ETP sludge with acid proof brick lining and proper slope & seepage collection pit.
2.	Agitated Stirred Reactor with Alkali Scrubber as APCD and stack of adequate height.
3.	Filter Press
4.	Storage vessel for storage of ML / Filtrate.
5.	Dryer and, ball Mill for size reduction of recovered material after drying.
6.	Dryer and ball mill shall be attached with a cyclone/ bag filter with a stack of adequate height.
7.	Paver Block Machine (Automatic / Manual).
8.	Stack to have sampling port, platform, access to the platform etc. as per the guidelines on methodologies for source emission monitoring published by CPCB under Laboratory Analysis Techniques LATS/80/2013-14.



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

**Utilization/Distillation of Dilute Acetic Acid (generated from
Pharmaceutical/ Pesticide/Chemical Sector) as resource material
for manufacturing of Acetic Anhydride or Glacial Acetic Acid**



March, 2021

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

**Utilization/Distillation of Dilute Acetic Acid (generated from Pharmaceutical/
Pesticide/Chemical Sector) as resource material for manufacturing of Acetic
Anhydride or Glacial Acetic Acid**

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

- 1) While granting authorisation for utilization of hazardous wastes, SPCBs/PCCs shall ensure that authorisation is given only to those wastes for which SoPs for utilisation have been circulated by CPCB ensuring the following:
 - a. The waste (intended for utilization) belongs to similar source of generation as specified in SoP.
 - b. The utilization shall be similar to as described in SoP.
 - c. End-use/ product produced from the waste shall be same as specified in SoP.
 - d. Authorisation shall be granted only after verification of details and minimum requisite facilities as given in SoP.
 - e. Issuance of passbooks (similar to passbooks issued for recycling of used oil, waste oil, non-ferrous scraps, etc.) for maintaining records of receipt of hazardous waste for utilization.
- 2) After issuance of authorization, SPCB shall verify the compliance of checklist and SoP on quarterly basis for initial 2 years; followed by random checks in the subsequent period for atleast once a year.

In-case of lack of requisite infrastructures with the SPCBs/PCCs, they may engage 3rd party institutions or laboratories having EPA, 1986/NABL/ISO17025 accreditation / recognition for monitoring and analysis of prescribed parameters in SoPs for verification purpose.
- 3) SPCBs shall provide half yearly updated list of units permitted under Rule 9 of Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 (HOWM Rules, 2016) to CPCB and also upload the same on SPCB website, periodically. Such updated list shall be sent to CPCB on a half yearly basis i.e., by July and January respectively.
- 4) 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 (generated during utilisation) or its complete utilisation or arrangement of sharing with any other authorised disposal facility.
- 5) In case of the utilization proposal is not similar with respect to source of generation or utilization process or end-use as outlined in this SoP, the same may be referred to CPCB for clarification /conducting trial utilization studies and developing SoPs.
- 6) The source and work zone standards suggested in the SoP are based on the E(P)A notified and OSHA standard respectively, however, SPCB/PCC may impose more stringent standards based on the location or process specific conditions.

63.0 Utilization of Dilute Acetic Acid:

Type of HW/OW	Source of generation	Recovery/Product
Dilute Acetic Acid (Schedule-I, Cat-26.3/29.6/Schedule-II Class B 15 Inorganic acids (of HOWM Rules, 2016)	Generated from Manufacturing of Pharmaceutical/Pesticide/Chemical Industry	Dilute Acetic Acid is used along with Fresh Acetic Acid for manufacturing of Acetic Anhydride to reduce quantity of fresh acetic acid required for manufacturing of Acetic Anhydride/ Preparation of Glacial Acetic acid

**Utilization/Distillation of Dilute Acetic Acid (generated from Pharmaceutical/
Pesticide/Chemical Sector) as resource material for manufacturing of Acetic
Anhydride or Glacial Acetic Acid**

63.1 Source of Waste

Dilute Acetic Acid (25-30% acidity) generated from manufacturing process of Pharmaceutical/Pesticide/Chemical Industry are categorized as hazardous waste at Cat-26.3/29.6 of Schedule-I, / Class B 15 Inorganic acids of Schedule-II of HOWM Rules, 2016, that can be utilised as resource.

Typical characteristics of Dilute Acetic Acid (25-30% acidity) are presented at as below:

Table 1- Characteristics of Dilute Acetic Acid (25-30% acidity)

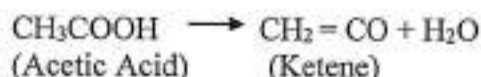
Sr. No.	Parameter	Unit	Pharmaceutical
1	Appearance		Light Brown
2	pH		<1
3	Purity	%	38.19
4	TOC	%	20.8
5	Chloride as Cl	ppm	146
6	Copper as Cu	mg/Kg	0.08
7	Zinc as Zn	mg/Kg	0.082
8	Iron as Fe	mg/Kg	0.18
9	Nickel as Ni	mg/Kg	0.098
10	Lead as Pb	mg/Kg	0.012
11	Moisture content by KF	%	18.39
12	Ethyl Acetate	%	0.02

63.2 Utilization Processes

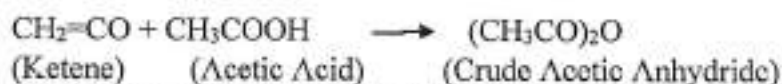
Hazardous waste Dilute Acetic Acid (25-30% acidity) and dilute acetic acid generated internally from furnace during anhydride manufacturing process is mixed and diluted to 20 % acidity and then extracted with ethyl acetate in extraction column. Extract phase (Ethyl Acetate + Acetic Acid) is separated out using atmospheric distillation. Acetic acid is recovered from extract phase in recovery column and recovered dilute acetic acid (20 % acidity) is sent to furnace followed by absorption column and distillation column for recovery of product i.e. Acetic Anhydride. Acetic acid recovered from this section is further used as raw material for anhydride generation section.

The Product Acetic Anhydride is manufactured from Acetic Acid in three stages.

In first stage, Acetic Acid is cracked at high temperature under vacuum in a furnace in presence of catalyst Tri Ethyl Phosphate (TEP) and ammonia (inhibitor) producing Ketene gas and water.



In Second stage, Ketene is absorbed in glacial acid in absorption section, producing crude Acetic Anhydride.



In third stage, Crude Anhydride is distilled out in Distillation section under vacuum to get pure Anhydride (99.5 %).

**Utilization/Distillation of Dilute Acetic Acid (generated from Pharmaceutical/
Pesticide/Chemical Sector) as resource material for manufacturing of Acetic
Anhydride or Glacial Acetic Acid**

63.3 Product Usage / Utilization

Hazardous waste i.e. Dilute Acetic Acid shall be used along with fresh acetic acid for manufacturing of Acetic Anhydride. Final product i.e. Acetic Anhydride is widely use as acetylating agent or in chemical synthesis.

63.4 Standard Operating Procedure for utilization

This SoP is applicable only for Utilization/Distillation of Dilute Acetic Acid (generated from (Acetylation Process from Pharmaceutical Sector) as resource material for manufacturing of Acetic Anhydride.

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

Hazardous waste i.e. Dilute Acetic Acid (DAA) from generator shall be transported in dedicated tanker and stored in tank. DAA is pumped from this tank to DAA feed tank for extraction, Extraction Column (adding Ethyl Acetate), Furnace, Absorption, Distillation, Acetic Anhydride as Product.

- 2) Dilute Acetic Acid shall be stored in either HDPE or rubber lined steel tank and kept in acid proof brick lined dyke under shed. Unit shall provide slope and collection pit in storage area.

Hazardous waste i.e. Dilute Acetic Acid (DAA) shall be transported from the external unit through dedicated tankers and after checking the require documentation and quality parameter this was allowed to unload in dedicated storage tank in the tank unloading area. DAA was unloaded from closed tanker to the closed storage tank directly through hose pipe

- 3) There shall be no manual handling of the Dilute Acetic Acid. Diluted Acetic Acid shall be unloaded from the closed tanker to the storage tank by using nitrogen gas pressurization technique and using dedicated transfer pump. Spill containment arrangement shall be provided around the Dilute Acetic Acid storage tanks.
- 4) The storage and handling of Dilute Acetic Acid shall be done under a shed of proper vertical height and over imperviously lined flooring.
- 5) The unit shall install storage tanks under cool, dry, well ventilated covered storage shed(s) within premises, as authorized by the concerned SPCB/ PCC under Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, .

Further, the storage area of Dilute Acetic Acid shall have leak-proof floor tiles with adequate slope to collect spillage, if any, into a collection pit. The spillage from collection pit shall be transferred to ETP, as the cases may be, through chemical process pump.

- 6) The unit shall provide separate storage tanks for storage of chemicals and the storage tanks should be at designated place with proper cover and with acid brick lining floors.
- 7) The treated gases shall comply with emission norms and prior to dispersion into atmosphere through stack. The height of stack shall be a minimum of 6 m above the roof top or as prescribed by the concerned SPCB/PCC, whichever is higher.

**Utilization/Distillation of Dilute Acetic Acid (generated from Pharmaceutical/
Pesticide/Chemical Sector) as resource material for manufacturing of Acetic
Anhydride or Glacial Acetic Acid**

- 8) The unit shall maintain proper ventilation in the work zone and process areas. All personnel involved in the plant operation shall wear proper personal protective equipment (PPE) specific to the process operations involved and type of chemicals handled as per Material Safety Data Sheet (MSDS). The safety precautions of the worker shall be in accordance with the Factory Act, 1948, as amended from time to time.
- 9) Treatment and disposal of wastewater:
Wastewater generated from floor-washings, spillages, reactor washing, scrubber bleed including the wastewater from filtration shall be treated Physico-Chemically in an ETP or may be sent to CETP for final disposal or be treated further in a captive facility to comply with surface water discharge standards.
Wastewater Standard for treated effluent from ETP shall be prescribed in Consent to Operate issued by SPCB/PCC.
In case of zero discharge condition by SPCB/PCC, the treated waste water from ETP may be managed as per conditions stipulated by the SPCB/PCC.
- 10) The treated effluent shall be discharged in accordance with the conditions stipulated in the Consent to Operate issued by concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974.
- 11) The hazardous wastes generated (namely the Process residue, ETP Sludge, Corrosive waste, waste insulation material, Contaminated aqueous waste phase, Spent Solvent, Distillation Residue etc.) shall be collected and temporarily stored in non-reactive drums/ bags under a dedicated hazardous waste storage area and be sent to authorized common TSDF or MEE or other authorized facility within 90 days from generation of the waste in accordance with the authorization issued by the concerned SPCB/PCC. Such storage area shall be covered with proper ventilation.
- 12) It shall be ensured that the Dilute Acetic Acid are procured from the industries, which have valid authorization from the concerned State Pollution Control Board as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- 13) Transportation of Dilute Acetic Acid shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorisation from the concerned SPCB under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016. Requisite manifest document shall be followed as laid down under the said Rules.
- 14) Prior to utilization of Spent Dilute Acetic Acid, the unit shall obtain authorisation for generation, storage and utilization of Dilute Acetic Acid from the concerned State Pollution Control Board under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- 15) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the occupier (sender or receiver, as the case may be) shall be liable to implement immediate response measures, environmental site assessment and remediation of contaminated soil/ groundwater/ sediment etc. as per the "Guidelines on Implementing

**Utilization/Distillation of Dilute Acetic Acid (generated from Pharmaceutical/
Pesticide/Chemical Sector) as resource material for manufacturing of Acetic
Anhydride or Glacial Acetic Acid**

Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Wastes and Penalty" published by CPCB.

- 16) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.
- 17) During the process of utilization and handling of hazardous waste the unit shall comply with requirement in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable. The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.

63.5 Record>Returns Filing

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

63.6 Standards

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

Parameters	Standard
PM	50 mg/Nm ³
SO ₂	100 ppm
NO _x	50 ppm
Acid Mist (CH ₃ COOH)	50 mg/Nm ³

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

Parameter	Standards
PM ₁₀	5 mg/m ³ TWA* (PEL)
Acid Mist (CH ₃ COOH)	25 mg/Nm ³

PEL, Permissible Exposure Limit

*time-weighted average (TWA): measured over a period of 8 hours of operation of process.

**Utilization/Distillation of Dilute Acetic Acid (generated from Pharmaceutical/
Pesticide/Chemical Sector) as resource material for manufacturing of Acetic
Anhydride or Glacial Acetic Acid**

- 3) Monitoring of the above specified parameters for source emission shall be carried out quarterly for first year followed by at least annually in the subsequent year of utilization. Fugitive emission for specified parameters shall be carried out quarterly. The monitoring shall be carried out by NABL or EPA approved laboratories and the results shall be submitted to the concerned SPCB/PCC on a quarterly basis.
- 4) Standard for wastewater discharge: Treated effluent shall be discharged in accordance with the conditions stipulated in Consent to Operate issued by respective SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974. In case of zero discharge or no discharge condition stipulated in the said consent or non-availability of the Common Effluent Treatment Plant (CETP), zero discharge shall be met.

63.7 Siting of Industry

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

63.8 On-line detectors / Alarms / Analysers

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

63.9 Checklist of Minimal Requisite Facilities

S.No.	Particulars
1.	Storage tanks of adequate capacity to store Dilute Acetic Acid. Such storage tanks shall be placed above the ground and contained with low rise parapet/bund wall and acid proof floor with slope to collect spillages, if any, in to collection pit. Alternately, the storage tanks may be below the ground provided it has HDPE liner system beneath the tank and leachate collection system below HDPE liner.
2.	Cool, dry well-ventilated covered sheds for Dilute Acetic Acid storage tanks, product storage tanks and process activities within premises and dedicated hazardous storage area for temporary storage of hazardous waste generated during utilization process.
3.	Mechanized system for transfer of Dilute Acetic Acid from storage tanks to Distillation Column or Extractor.
4.	The process units shall have suction hood. (The suction hood shall be connected with alkali scrubber and stack of adequate height)
5.	Spare vessel to transfer the reaction mass, if any, in case of leakage or damage to the Distillation Column or Extractor.
6.	Pumps, pipes, feeders and other equipment for mechanical handling of Dilute Acetic Acid.
7.	Stack to have sampling port, platform, access to the platform etc. as per the guidelines on methodologies for source emission monitoring published by CPCB under Laboratory Analysis Techniques LATS/80/2013-14.
8.	Furnace, Absorption Column, Distillation Column, External Column, Condenser, Recovery Column, Chiller.
9.	ETP Plant
10.	Connection of vent of all the dilute acetic acid storage tanks be connected to condenser.
11.	VOC absorption media connected to vent of condenser



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

**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap)
for recovery of metal salts/alloys**



March, 2021

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

**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

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

- 1) While granting authorisation for utilization of hazardous wastes, SPCBs/PCCs shall ensure that authorisation is given only to those wastes for which SoPs for utilisation have been circulated by CPCB ensuring the following:
 - a. The waste (intended for utilization) belongs to similar source of generation as specified in SoP.
 - b. The utilization shall be similar to as described in SoP.
 - c. End-use/ product produced from the waste shall be same as specified in SoP.
 - d. Authorisation shall be granted only after verification of details and minimum requisite facilities as given in SoP.
 - e. Issuance of passbooks (similar to passbooks issued for recycling of used oil, waste oil, non-ferrous scraps, etc.) for maintaining records of receipt of hazardous waste for utilization.
- 2) After issuance of authorization, SPCB shall verify the compliance of checklist and SoP on quarterly basis for initial 2 years; followed by random checks in the subsequent period for atleast once a year.
In-case of lack of requisite infrastructures with the SPCBs/PCCs, they may engage 3rd party institutions or laboratories having EPA, 1986/NABL/ISO17025 accreditation / recognition for monitoring and analysis of prescribed parameters in SoPs for verification purpose.
- 3) SPCBs shall provide half yearly updated list of units permitted under Rule 9 of Hazardous & Other Wastes (Management & Transboundary Movement) Rules, 2016 (HOWM Rules, 2016) to CPCB and also upload the same on SPCB website, periodically. Such updated list shall be sent to CPCB on a half yearly basis i.e., by July and January respectively.
- 4) 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 (generated during utilisation) or its complete utilisation or arrangement of sharing with any other authorised disposal facility.
- 5) In case of the utilization proposal is not similar with respect to source of generation or utilization process or end-use as outlined in this SoP, the same may be referred to CPCB for clarification /conducting trial utilization studies and developing SoPs.
- 6) The source and work zone standards suggested in the SoP are based on the E(P)A notified and OSHA standard respectively, however, SPCB/PCC may impose more stringent standards based on the location or process specific conditions.

64.0 Utilization of metal and metal bearing wastes:

S.No.	Type of HW/OW		Source of generation	Recovery/Product
	Name of HW	Category of HW		
1.	Tin scrap	(Basel No. B-1010, Part D of Schedule-III of	Scrap generated during smelting, cutting tools, plating droppings,	Refined Tin metal.

**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

2.	Tungsten Scrap	HOWM Rules, 2016)	melting pots, ordinance factory, scrap traders, etc.	Recovery of sodium tungstate and tungsten carbide powder
3.	Cobalt Scrap			Cobalt Hydroxide
4.	Vanadium, Tantalum and Niobium Scrap			Metal Powder of Vanadium, Tantalum and Niobium

64.1 Source of Waste

Scrap of Tin, Tungsten, Cobalt, Vanadium, Tantalum and Niobium are generated during smelting, cutting tools, plating droppings, melting pots and procured from ordinance factory, scrap traders, etc. are categorized as metal and metal-bearing wastes at Basel No. B-1010, Part D of Schedule-III of HOWM Rules, 2016, that can be utilised as resource in metal salts/alloys recovery.

Characteristics of metal scraps are given below:

Table 1- General composition of Tin Scrap/dross/slag

Sl. No.	Tin dross/oxides	Percentage
1.	Tin (Sn)	70
2.	Copper (Cu)	1
3.	Oxygen (O ₂)	18
4.	Misc. (Ag, Sb, etc.)	1
Tin scrap/droppings		
1.	Tin (Sn)	90
2.	Al/Zn	3
3.	SnO ₂	7

Table 2- General composition of Tungsten Scrap

Sl. No.	Tungsten Scrap	Percentage
1.	Tungsten (W)	98
2.	Cobalt (Co)	2

Table 3- General composition of Vanadium, Tantalum and Niobium Scrap

Sl. No.	Vanadium/Tantalum/Niobium	Percentage
3.	Vanadium/Tantalum/Niobium	99
4.	Alloy dropping	1

**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

64.2 Utilization Processes

- i. **Tin Scrap:** The Tin scrap firstly mixed with binder materials i.e. Borax, Soda Ash and Furnace Oil. The blending of the charging material is carried out in Double Cone Blender-cum-dryer. The charged blended material is then used in each graphite crucibles. Coal is used for heating and melting the metal in pit furnaces. Each batch runs for 2 hours at about 1200 °C temperature. After 2 hours of heating & melting the melted metal is transferred to the crucibles and further refined by Saw dust and diesel. The Tin scrap to refined Tin takes 4 hours in total. The product quantity varies from 30-80% of the raw material.

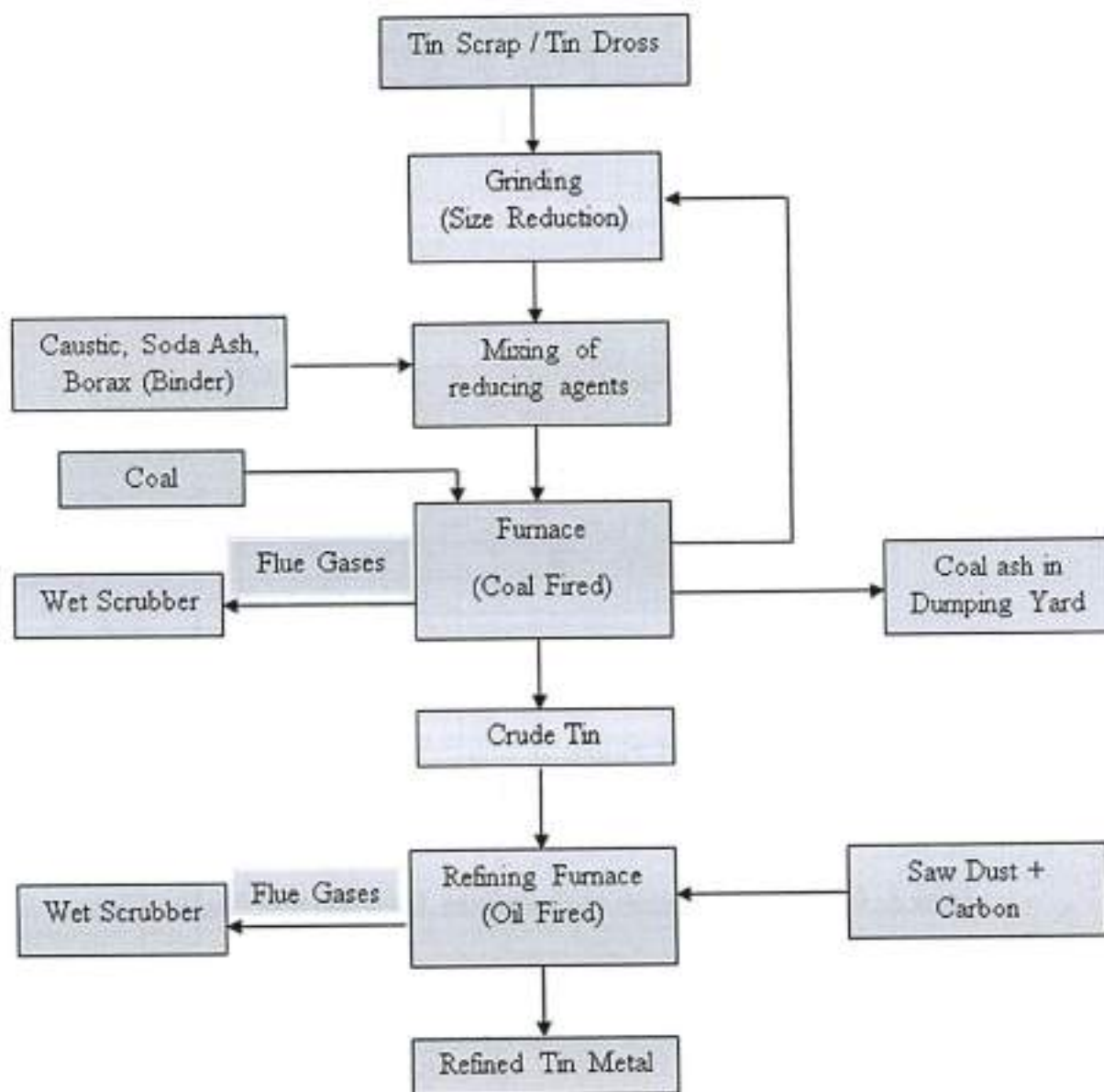


Figure: 1-Process flow diagram for utilization tin scrap/dross for recovery of Tin metal.

**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

ii. Tungsten Scrap:

a. Step I: Production of Sodium Tungstate:

Tungsten Metal scrap is fused with sodium nitrate and soda ash at 300 °C in refining furnace. Fused material is leached with water having 2% NaOH. Upon filtration, the filtrate is taken to MS PP tank and HCl added to get sodium tungstate. Sodium Tungstate cake is separated by further filtration.

b. Step II: Production of Tungsten Carbide Powder:

This Sodium Tungstate is leached in ammonia solution and pH adjusted to 6.8 by adding HCl. Slurry formed is filtered and separated and Ammonium Para Tungstate (APT) Cake of yellow color is formed and further dried. APT is fed into oxidation furnace at 600 °C. Oxidized tungsten is reduced to tungsten powder by hydrogen reduction furnace. Tungsten Powder thus formed is mixed with 4% carbon and cobalt. This mixture is sintered in hydrogen reduction furnace. Tungsten Carbide powder is formed.

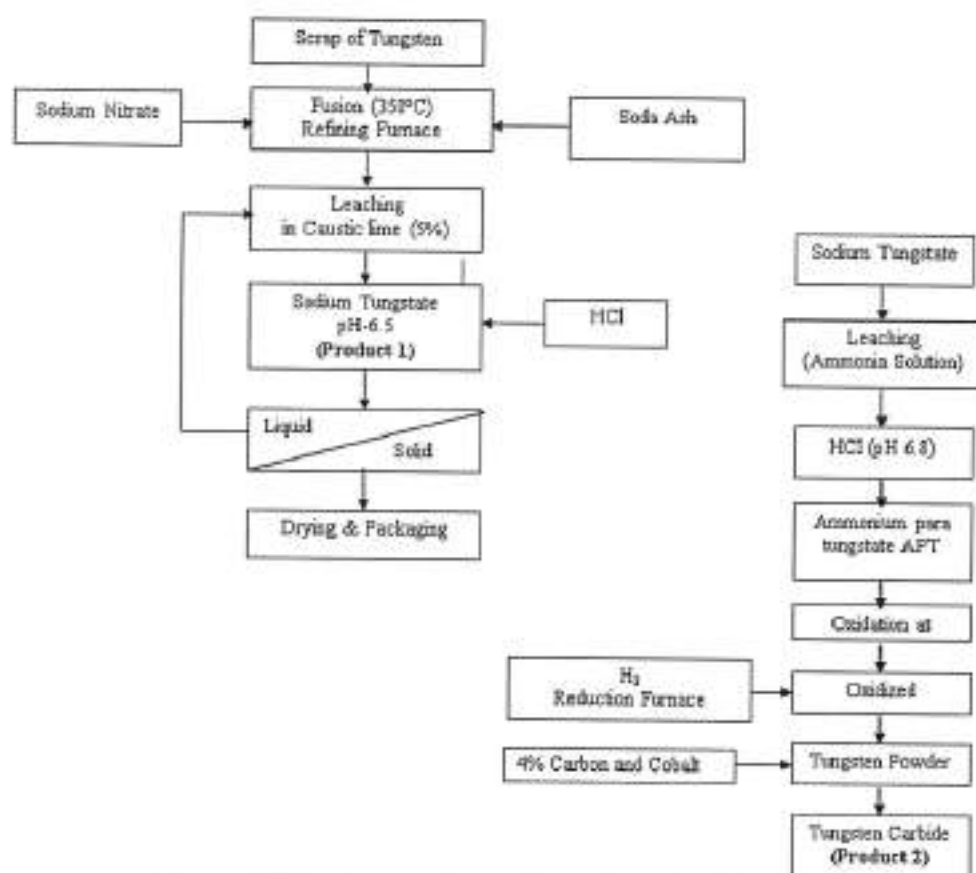


Figure: 2-Process flow diagram for utilization tungsten scrap for recovery of Tungsten Carbide Powder.

**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

- iii. Cobalt Scrap:** Cobalt scrap undergoes leaching in water with sodium carbonate (soda ash) at 600 °C. The fused leach solution undergoes solid-liquid separation and sodium hydroxide is added into leached liquid. Solid separation goes back to leaching with soda ash again. After reaction with NaOH, Cobalt hydroxide is formed which is washed with water and dried.

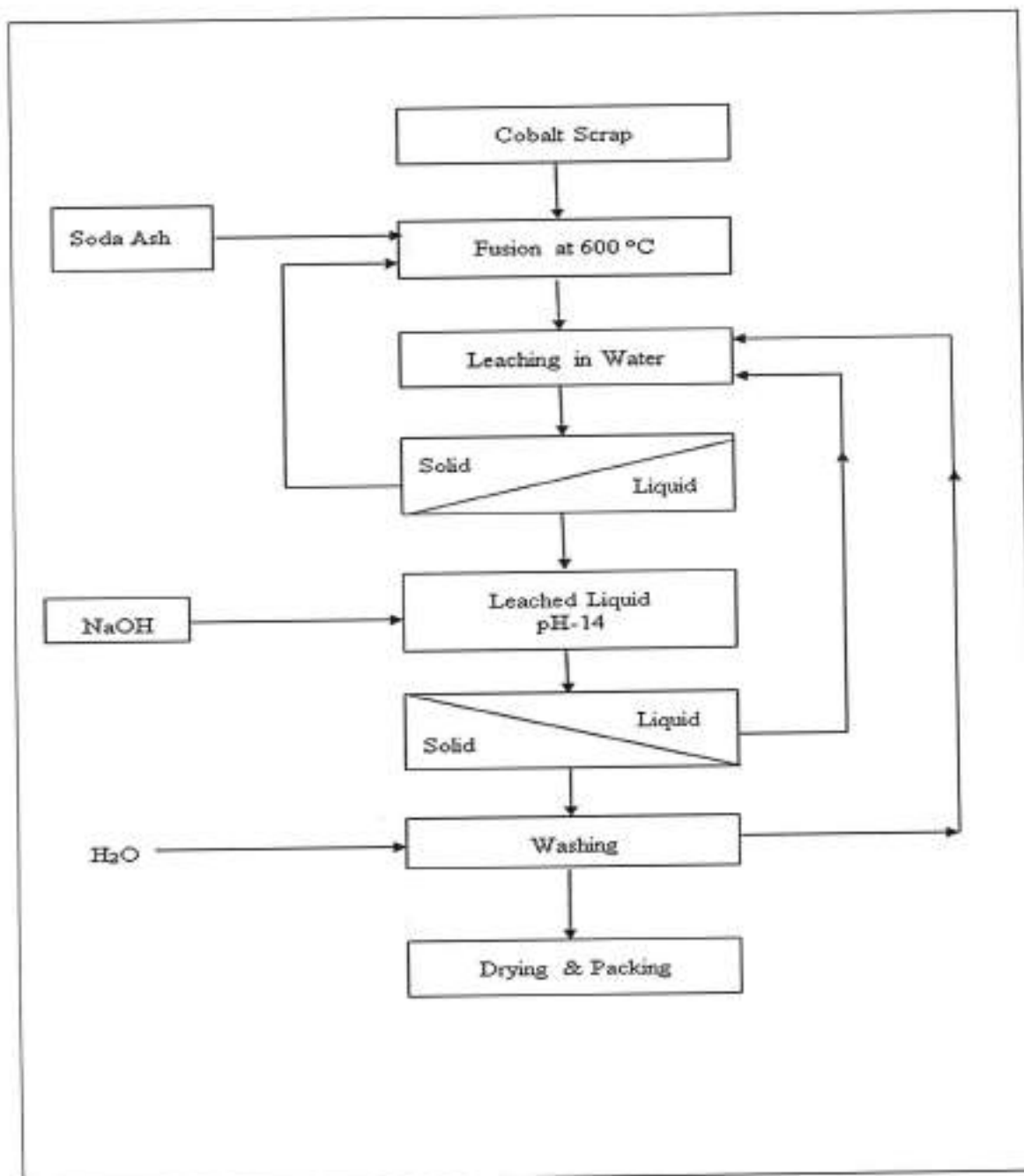


Figure: 3-Process flow diagram for utilization cobalt scrap for recovery of cobalt hydroxide.

**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

- iv. **Vanadium, Tantalum and Niobium Scrap:** Vanadium, Tantalum and Niobium alloy scrap undergoes oxidation in oxidation furnace at 350 °C, 650 °C and 1000 °C respectively. At different gauss, the metal powder of desired product obtained at their respective magnetic flux density.

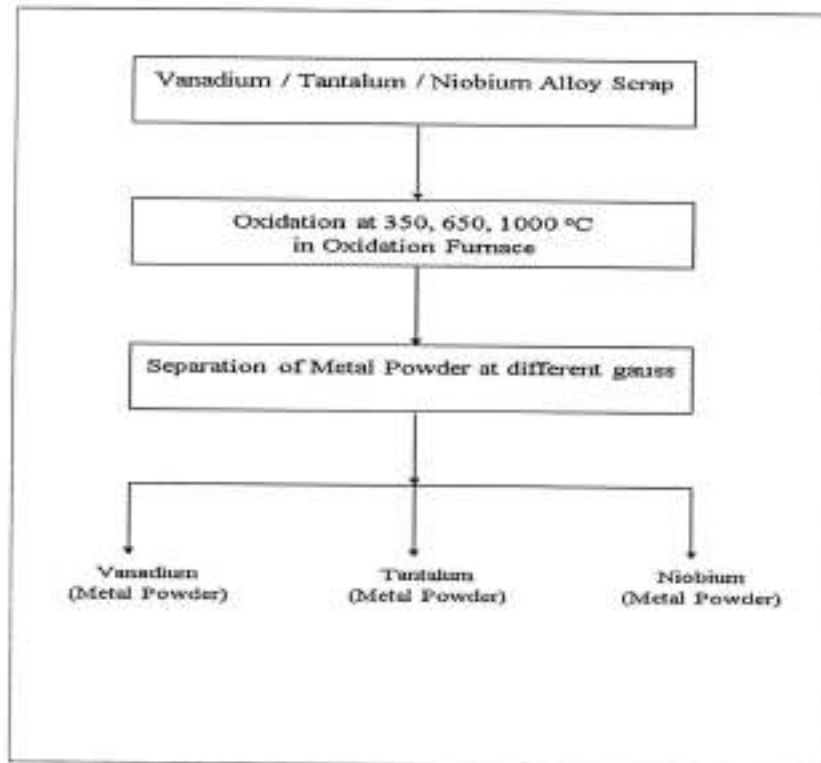


Figure: 4-Process flow diagram for utilization of Vanadium, Tantalum and Niobium scrap for recovery of their metal alloys

64.3 Product Usage / Utilization

The tin scrap/dross shall be used as resource in recovery of refined Tin metal, which may be reused in further manufacturing of various Tin alloys.

Cobalt Scrap shall be used as resource for recovery of cobalt hydroxide.

Tungsten scrap shall be used as resource for recovery of sodium tungstate and Tungsten Carbide powder.

Vanadium, Tantalum and Niobium scrap shall be used as resource for recovery of their metal powder, to be further used for manufacturing metal alloys.

64.4 Standard Operating Procedure for utilization

This SoP is applicable only for utilization of metal and metal bearing wastes containing scrap of Tin, Tungsten, Cobalt, Vanadium, Tantalum and Niobium are generated during smelting, cutting tools, plating droppings, melting pots and procured from ordinance factory, scrap traders, etc. for recovery of metal salts/alloys.

**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

- 1) The other wastes i.e. scraps (dross in drums) shall be stored in well ventilated, covered storage shed(s) within premises, as authorized by the concerned SPCB/ PCC under Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016, so as to eliminate rain water intrusion.

Further, the storage area floor is of concrete with impervious base shall have adequate slope to collect spillage, if any, in a designated pit.
- 2) The handling of hazardous and other wastes i.e. scraps shall be carried out using mechanical means with minimal manual intervention.
- 3) The handling and storage of raw materials (scraps) or additional materials such as coal, reducing agents (borax, soda ash, saw dust), acids, etc. shall be done in separate storage sheds or atleast properly demarcated/partitioned area in case of one shed.
- 4) Chemicals and additives shall be procured in non-reactive containers/drums and stored under cool, dry, well ventilated and covered storage shed.
- 5) Acid (such as HCL) used in production of sodium tungstate shall be stored under shed and should have leak-proof floor tiles with adequate slope to collect spillage, if any, into a collection pit. The spillage from collection pit shall be transferred to reaction tanker or ETP, as the cases may be, through chemical process pump.
- 6) Transfer of hazardous and other wastes i.e. scraps from storage shed to furnaces (pit/reduction/tilting) and fused scraps to leaching reactors shall be transferred through mechanised claw/conveyer system with minimal manual intervention.
- 7) The chemicals, additives, leachate and filtrate of the utilization processes shall be transferred to the appropriate reaction/storage tanks using chemical process pumps.
- 8) If not recycled/recovered, filtered residues from reactors shall be disposed in authorized TSDF in accordance with the provisions stipulated in HOWM Rules, 2016.
- 9) There shall be a closed system of operations such as leaching. The reaction vessel shall be connected with suction hood above the feeding point (of fused scraps) to control acid/alkali fumes/vapours liberated from the reaction vessel. The suction hood shall be connected with scrubber and stack of adequate height or as prescribed by SPCB/PCC.
- 10) The fume hoods of furnaces ((pit/reduction/tilting)) shall be connected to bag filters and stack of adequate height or as prescribed by SPCB/PCC.
- 11) All vapour lines of reactors shall be connected with condenser for reflux back to reactor to minimize acid requirements and finally to receiver for recovery vapour line from receiver will be connected to suitable APCD (i.e. scrubber).
- 12) The unit shall maintain proper ventilation in the work zone and process areas. All personnel involved in the plant operation shall wear proper personal protective equipment (PPE) specific to the process operations involved and type of chemicals handled as per Material Safety Data Sheet (MSDS). The safety precautions of the worker shall be in accordance with the Factory Act, 1948, as amended from time to time.



**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

- 13) The treated effluent shall be discharged in accordance with the conditions stipulated in the Consent to Operate issued by respective SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974.
- 14) Prior to utilization of hazardous and other wastes i.e. scraps, the unit shall obtain authorisation for generation, storage and utilization of such hazardous and other wastes from the concerned State Pollution Control Board under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- 15) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the occupier (sender or receiver, as the case may be) shall be liable to implement immediate response measures, environmental site assessment and remediation of contaminated soil/ groundwater/ sediment etc. as per the "Guidelines on Implementing Liabilities for Environmental Damages due to Handling & Disposal of Hazardous Wastes and Penalty" published by CPCB.
- 16) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.
- 17) During the process of utilization and handling of hazardous waste the unit shall comply with requirement in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

64.5 Record>Returns Filing

- 1) A log book with information on source, quantity, date wise utilisation of hazardous and other wastes and its generation and disposal, etc. shall be maintained including analysis report of fugitive emission monitoring & effluent discharged, as applicable.
- 2) The unit shall maintain record of hazardous and other wastes utilised, generated and disposed as per Form 3 & shall file annual returns in Form 4 as per Rule 20 (1) and (2) of the Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016, to concerned SPCB/PCC.
- 3) The unit shall submit quarterly and annual information on hazardous and other wastes consumed, its source, products generated or resources conserved (specifying the details like, type and quantity of resources conserved) to the concerned SPCB.

64.6 Standards

- 1) Source emissions from the stack connected to Air Pollution Control Device (APCD) of boiler furnace shall comply with the following standards or as prescribed by the concerned SPCB/PCC, whichever is stringent;
 - i. For utilization of Tin scrap (at stack of pit furnace):

Parameters	Standard
PM	50 mg/Nm ³
SO _x	200 mg/Nm ³



**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

- ii. For utilization of Tungsten scrap (at stack of hydrogen reduction furnace and oxidation furnace) :

Parameters	Standard
PM	50 mg/Nm ³
HCl vapour & mist	35 mg/Nm ³
NH ₃	30 mg/Nm ³

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

- i. For Utilization of Tin scrap:

Parameter	Standards
PM ₁₀	5 mg/m ³ TWA*
Tin (Sn)	2 mg/m ³ TWA*
NaOH	2 mg/m ³ TWA*

- ii. For utilization of Tungsten scrap:

Parameter	Standards
PM ₁₀	5 mg/m ³ TWA*
HCl	7 mg/m ³ TWA*
Acetic Acid (CH ₃ COOH)	25 mg/m ³ TWA*
Oxalic Acid	1 mg/m ³ TWA*
NH ₃	35 mg/m ³ TWA*
Tungsten (as W) Insoluble compounds	5 mg/m ³ TWA*
Tungsten (as W) Soluble compounds	1 mg/m ³ TWA*
Tungsten carbide containing cobalt as binder	0.1 mg/m ³ TWA*

- iii. For utilization of cobalt scrap:

Parameter	Standards
PM ₁₀	5 mg/m ³ TWA*
Cobalt as (Co)	0.1 mg/m ³ TWA*
Chromium (as Cr)	1 mg/m ³ TWA*
NaOH	2 mg/m ³ TWA*

- iv. For utilization of Vanadium/Tantalum/Niobium alloy scrap:

Parameter	Standards
PM ₁₀	5 mg/m ³ TWA*
Vanadium (Respirable dust as V ₂ O ₅)	0.5 mg/m ³ (#C)
Vanadium (Fume as V ₂ O ₅)	0.1 mg/m ³ (#C)
Tantalum, metal and oxide dust	5 mg/m ³ TWA*
Titanium Dioxide (Total Dust)	15 mg/m ³ TWA*
Hafnium	0.5 mg/m ³ TWA*

Ceiling Limit

*time-weighted average (TWA): measured over a period of 8 hours of operation of process.

**Utilization of metal and metal bearing wastes
(Tin/Tungsten/Cobalt/Vanadium/Tantalum/Niobium Scrap) for recovery of
metal salts/alloys**

- 3) Monitoring of the above specified parameters for source emission shall be carried out quarterly for first year followed by at least annually in the subsequent year of utilization. Fugitive emission for specified parameters shall be carried out quarterly. The monitoring shall be carried out by NABL or EPA approved laboratories and the results shall be submitted to the concerned SPCB/PCC on a quarterly basis.
- 4) Standard for wastewater discharge: Treated effluent shall be discharged in accordance with the conditions stipulated in Consent to Operate issued by respective SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974. In case of zero discharge or no discharge condition stipulated in the said consent or non-availability of the Common Effluent Treatment Plant (CETP), zero discharge shall be met.

64.7 Siting of Industry

This SoP is applicable only for utilization of metal and metal bearing hazardous and other wastes namely Tin, Tungsten, Cobalt, Vanadium, Tantalum and Niobium scraps and facilities for their utilization shall be located in a notified industrial area or industrial park/estate/cluster and in accordance with Consent to Establish issued by the concerned SPCB/PCC.

64.8 On-line detectors / Alarms / Analysers

In case of continuous process operations, online emission analysers for PM and SO_x in the stack of pit furnace (for Tin scrap utilization) & PM and HCl vapour & mist in the stack of hydrogen reduction & oxidation furnace (for Tungsten scrap utilization) shall be installed and the online data be connected to the server of the concerned SPCB/PCC and CPCB.

64.9 Checklist of Minimal Requisite Facilities

Sl. No.	Particulars
1	Covered storage shed of adequate capacity to store hazardous and other wastes for at least two weeks requirement but preferably for 30 days.
2	Cool, dry well-ventilated covered storage shed(s) for hazardous and other wastes, other raw materials/chemical storage and process activities within premises.
3	Enclosed pumping/mechanized conveyer system for handling and transfer of hazardous and other wastes from storage area to reactors and/or furnaces.
4	Rotary Drier, Pulverizer, Non-reactive Storage tanks
5	Centrifuge, Transfer Pumps, Filter Press & Evaporators.
6	Furnaces (Hydrogen Reduction, Oil Fired Tilting), Refining Pots, Leaching Reactors.
7	Wet Scrubbers and Bag Filters (APCD).
8	Stack of proper height as prescribed by SPCB with sampling port, platform, access to the platform etc. as per the guidelines on methodologies for source emission monitoring published by CPCB under Laboratory Analysis Techniques LATS/80/2013-14.
