74942/2022/WM-II-HO

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 Galvanizing unit) in the manufacturing of Iron Ore Pellet

November, 2022

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

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

1) While granting authorization for utilization of hazardous wastes, SPCBs/PCCs shall ensure that authorization is given only to those wastes for which Standard Operating Procedures (SoPs) for utilisation have been circulated by Central Pollution Control Board (CPCB) ensuring the following:
   a. The waste (intended for utilization) belongs to same source of generation as specified in SoP.
   b. The utilization shall be same as described in SoP.
   c. End-use/ product produced from the waste shall be same as specified in SoP.
   d. Authorization shall be granted only after verification of details and minimum requisite facilities as given in SoP.
   e. Issuance of passbooks (similar to passbooks issued for recycling of used oil, waste oil, non-ferrous scraps, etc.) for maintaining records of receipt of hazardous waste for utilization.

2) After issuance of authorization, SPCBs/PCCs shall verify the compliance of checklist and SoP on quarterly basis for initial 2 years; followed by random checks during subsequent period for atleast once a year. The compliance reports shall be submitted to CPCB by July every year.

3) In-case of lack of requisite infrastructures with the SPCBs/PCCs, they may engage 3rd party institutions or laboratories having EPA, 1986/NABL/ISO17025 accreditation/recognition for monitoring and analysis of prescribed parameters in SoPs for verification purpose.

4) SPCBs/PCCs shall provide half yearly updated list of units permitted under Rule 9 of Hazardous & Other Wastes (Management & Transboundary Movement) [HOWM] Rules, 2016 to CPCB and also upload the same on SPCB/PCC website, periodically. Such updated list shall be sent to CPCB on half yearly basis i.e., by July and January respectively.

5) Authorization for utilisation shall not be given to the units located in the State/Union Territory where there is no Common TSDF, unless the unit ensures authorised captive disposal of the hazardous waste (generated during utilisation) or its complete utilisation or arrangement of sharing with any other authorised disposal facility.

6) In case of the utilization proposal is not same 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 studies and developing SoPs thereof.

7) The source and work zone standards suggested in the SoP are based on E(P)A notified and OSHA/NAAQ standard, respectively. However, SPCBs/PCCs may impose more stringent standards based on the location or process specific conditions.

82.0 Utilization of hazardous waste (H.W.):

Type of HW	Source of generation	Recovery/ Product
ETP Sludge (Category 35.3 of Schedule-I of HOWM Rules, 2016)	ETP of Galvanizing unit	As a raw material in the manufacturing of iron ore pellet

82.1 Source of Waste:

Galvanizing is a Process of protecting steel components against corrosion by Zinc coating, which is applied by dipping them in a bath of molten Zinc. Before dipping the steel component into Zinc bath, surface of the steel components is treated to remove oil, rust, grease etc. by de-greasing, rinsing, Pickling, etc. operations. The acidic wastewater generated from the galvanizing unit is neutralized with lime in effluent treatment plant (ETP). Sludge from ETP is collected by de-watering through thickener and filter press. This sludge slightly acidic and primarily contains iron.

The ETP sludge is categorized as hazardous waste as category 35.3 of Schedule I of HOWM Rules, 2016 which is required to be disposed in authorized disposal facility in accordance with authorization condition, when not utilized for resource recovery.

82.2 Utilization Process of hazardous waste (ETP Sludge):

Iron Ore fines charged into the ball mill through a belt conveyor and grinded with water. The slurry material from the thickener goes to the filtration and where iron ore cake is generated.

ETP sludge can be mixed with grinded iron ore fines, bentonite, dolomite & other raw materials to produce iron ore pellets, for use in recovery of iron in steel industry. This mixture is sent to the balling unit, where it is agglomerated on balling disc into green (or unfired) balls of 8 to 16mm size.

The green balls of desired size are subjected to drying, preheating, induration and cooling, during which the balls attain adequate strength. Green balls are dried and preheated in the travel grate machine, then solidified to get adequate strength by undergoing induration in the rotary kiln and cooled in the annular cooler. The finished product (i.e., Iron ore pellets) from the Annular cooler is stored.

Table 1. Typical Characteristics of H.W. (ETP Sludge)

S.no.	Parameters	Unit	Result
1.	pH	-	6.29
2.	LOI	%	41.21
3.	Moisture content	%	33.92
4.	Carbon content	%	0.62
5.	Sulphur	%	0.08
6.	Calorific value	Kcal/Kg	120
7.	Fluoride as F	mg/L	0.72
8.	Lead as Pb	mg/L	0.201
9.	Zinc as Zn	mg/L	0.28
10.	Cadmium as Cd	mg/L	ND
11.	Chromium as Cr	mg/L	ND
12.	Nickel as Ni	mg/L	ND
13.	Copper as Cu	mg/L	0.31
14.	Manganese	mg/L	0.08
15.	Arsenic as As	mg/L	ND
16.	Mercury as Hg	mg/L	ND
17.	Cobalt	mg/L	ND
18.	Vanadium	mg/L	ND
19.	Antimony	mg/L	ND
20.	TPH	mg/L	ND
21.	Iron as Fe	%	24.82

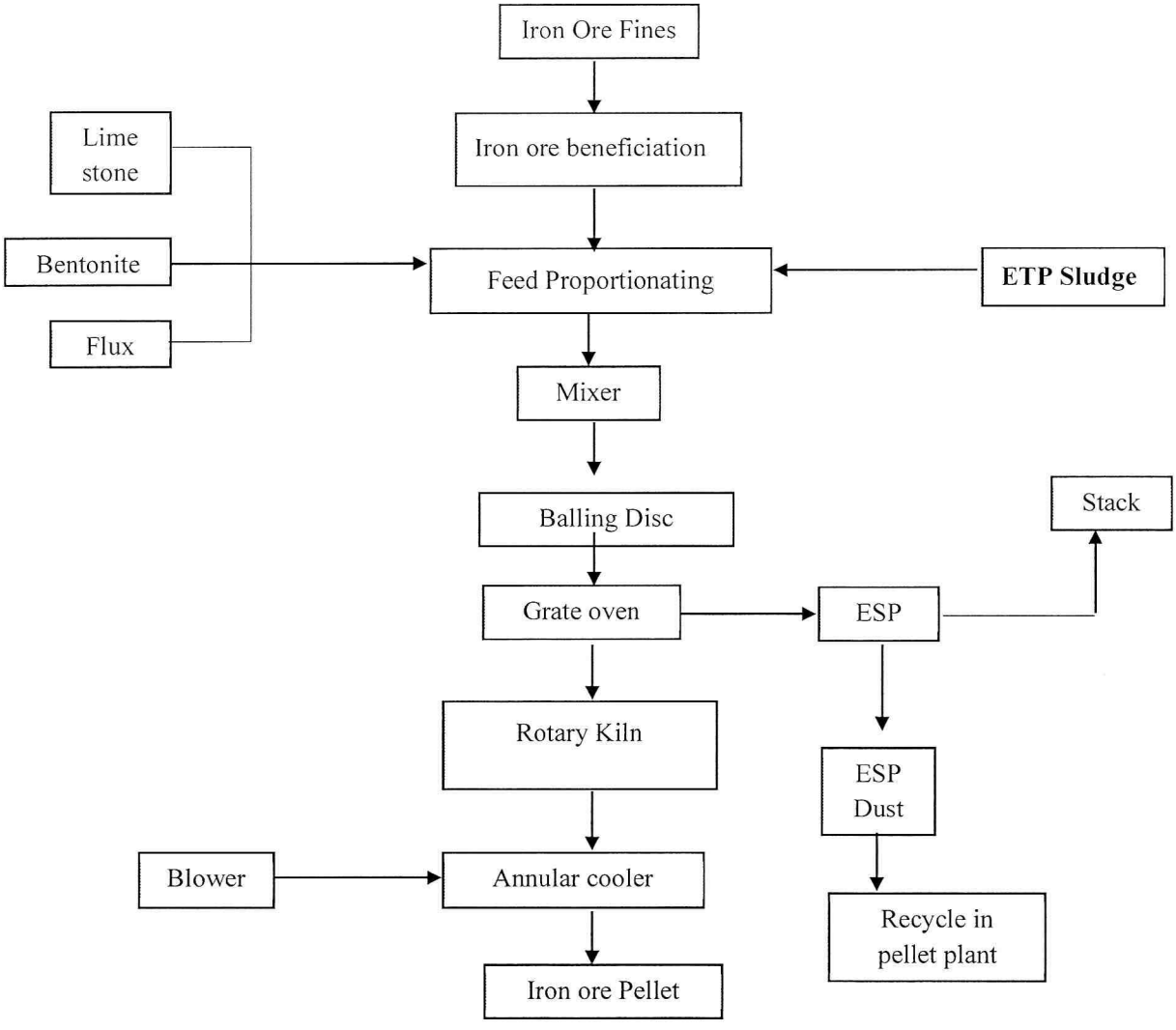

Figure: 1-Process flow diagram for utilization of ETP Sludge.

82.3 Product Usage / Utilization

ETP Sludge utilized as additional raw material (along with iron ore) in the manufacturing of iron ore pellet, which will be further utilized in steel industry for production of iron.

82.4 Standard Operating Procedure for utilization of ETP Sludge:

This SoP is applicable only for Utilization of ETP Sludge (generated from Galvanizing unit) in the manufacturing of Iron Ore Pellet.

1) ETP Sludge shall be procured only in SPCB/PCC authorized barrels/closed tanks mounted over vehicles fitted with requisite safeguards ensuring no emissions/spillages.
2) ETP sludge storage area shall be designated with covered shed in the premises so as to prevent rain water intrusion. Floor of storage area shall be acid proof brick lining to avoid any leachates to the ground with low raise bund wall and proper slope to collect spillages, if any, into a collection pit. The collected seepage / floor washing shall be channelized to ETP for further treatment or can be used in the said utilization process. Other raw materials shall be stored in storage tank separately.

3) The moisture content in the ETP sludge shall not exceed 34% before procurement.
4) The unloading, storage, crushing, transfer and other handling ETP sludge shall be carried out using mechanical means with minimal manual intervention.
5) Material transfer / handling in entire utilization process shall be equipped with canopy /hood system or done in closed system. Manual handling shall be restricted.
6) The unit shall ensure control of fugitive emissions in process area by adopting closed system; through dust extraction system with APCD such as bag filter and also, to carry out intermittent water sprinkling in the working area.
7) The gases from Grate, rotary kiln shall pass through APCD like Electro static precipitator to meet the prescribe standards given at section 82.6 below. If required, the unit shall augment air pollution control systems with bag filter / scrubber units to meet the emission standards.
8) The treated gases shall comply with emission norms prior to dispersion into atmosphere through stack. The stack height shall be minimum of 30m from ground level or as prescribed by the concerned SPCB/PCC, whichever is higher.
9) Treatment and disposal of wastewater: Wastewater generated from floor-washings, spillages, units washing etc. shall be reused in the process while mixing raw materials or treated Physico-Chemically in an ETP or may be sent to Common Effluent Treatment Plant (CETP) for final disposal or be treated further in a captive facility to comply with surface water discharge standards. In case of zero discharge, the treated waste water from ETP may be managed as per conditions stipulated by the SPCB/ PCC. The treated effluent shall be discharged in accordance with the conditions stipulated in the Consent to Operate issued by concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974.
10) The 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.
11) The wastes generated during utilization of ETP sludge (namely APCD dust etc.) during manufacturing process of unit shall be captively utilized with in the process or collected and temporarily stored in non-reactive drums/ bags under a dedicated hazardous waste storage area and be sent to authorized common TSDF or other authorized facility within 90 days from generation of the waste in accordance with the authorization issued by the concerned SPCB / PCC. Such storage area shall be covered with proper ventilation.
12) The unit shall ensure that the ETP sludge is procured from authorized industries as required under HOWM Rules, 2016.
13) Transportation of ETP sludge shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorization from the concerned SPCB under HOWM 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 authorization for handling, storage and utilization from the concerned SPCB/PCC under HOWM 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.

82.5 Record/Returns Filing

1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each procurement of ETP Sludge as mentioned below:
   - Address of the sender
   - Date of dispatch
   - Quantity procured
   - Seal and signature of the sender
   - Date of Receipt in the premises

2) A log book with information on source and date of procurement of 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 generated, utilized and disposed as per Form-3 & also file an annual return in Form-4 as per Rule 20 (1) and (2) of HOWM Rules, 2016, to concerned SPCB/PCC.

4) The unit shall submit quarterly and annual information on hazardous wastes consumed, its source, products generated or resources conserved (specifying the details like, type and quantity of resources conserved) to the concerned SPCB/PCC.

82.6 Standards

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

Particulate Matter	50 mg/Nm^3

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

PM_{10}	3 mg/m^3
NOx	13 mg/m^3 TWA* (PEL)
SO_2	5 mg/m^3 #

**PEL - Permissible Exposure Limit.*

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

 # - A ceiling limit is one that may not be exceeded for any period of time, and is applied to irritants and other materials that have immediate effects.

3) Monitoring of the above specified parameters for Work zone emission shall be carried out quarterly for first year followed by at least annually in the subsequent year of utilization. The monitoring shall be carried out by ISO 17025 accredited or EPA, 1986 approved laboratories and the results shall be submitted to the concerned SPCB/PCC on a quarterly basis.
4) Standard for wastewater discharge: Treated effluent shall be discharged in accordance with the conditions stipulated in Consent to Operate issued by concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974. In case of zero discharge or no discharge condition stipulated in the consent or non-availability of the common Effluent Treatment Plant (CETP), zero discharge shall be met.

82.7 Siting of Industry

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

82.8 Size of Plant and Efficiency of Utilisation

ETP sludge with moisture content < 34 % is allowed, accordingly, the facilities such as storage shed and handling equipment of adequate size and capacity shall be installed.

82.9 Online detectors/ Alarms/ Analyzers

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

82.10 Checklist of Minimal Requisite Facilities:

Sl. No	Particulars
1.	Dedicated storage area and shed for ETP Sludge with acid proof brick lining and proper slope & seepage collection pit.
2.	Mechanized and closed systems for handling & transfer of ETP Sludge.
3.	Grinding equipment, Filter press, Mixer, Disc Pelletizer, and induration plant for production of iron pellets.
4.	Dust extraction system followed by APCD where there is potential spaces for fugitive emissions.
5.	Material transfer / handling in entire recovery process shall be done without manual interventions in closed system.
6.	APCD like electro static precipitator followed by bag filter/scrubber, to meet the prescribed standards (as required).
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.	Online analyzers for PM, SO_2, NO_X in the stack in case of continuous process operations.

*****