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 LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust for manufacturing of L.D. Sludge agglomerates

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

1) While granting authorization for utilization of hazardous wastes, SPCBs/PCCs shall ensure that authorization is given only to those wastes for which Standard Operating Procedures (SoPs) for utilisation have been circulated by Central Pollution Control Board (CPCB) ensuring the following:

   a. The waste (intended for utilization) belongs to similar source of generation as specified in SoP.

   b. The utilization shall be similar to as described in SoP.

   c. End-use/ product produced from the waste shall be same as specified in SoP.

   d. Authorization shall be granted only after verification of details and minimum requisite facilities as given in SoP.

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

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

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

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

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

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

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

73.0 Utilization of hazardous waste (H.W):

Type of H.W	Source of generation	Recovery/Product
Linz-Donawitz (L.D.)/ Gas Cleaning Plant (GCP) Sludge, L.D/GCP Classifier Sludge and Blast Furnace Flue Dust Category 35.1, Schedule I (of HOWM Rules, 2016)	Generated as a result of cleaning the off gases during steel manufacturing process.	For manufacturing of L.D. Sludge agglomerates (Used in steel making)

73.1 Source of H.W:

The LD/GCP Sludge, LD/GCP Classifier Sludge and Blast furnace flue dust of steel/ ferro alloy plants is categorized as hazardous waste Category 35.1, Schedule I of HOWM Rules 2016.

Table 1. Typical Characteristics of hazardous waste are given below:

Sl. No.	Parameter	Unit	LD sludge	LD/GCP classifier sludge	Blast Furnace Flue Dust
1	Iron as Fe	g/kg	206.4	257.9	143.82
2	Zinc as Zn	mg/kg	477.5	65.17	390
3	Manganese as Mn	mg/kg	290	806	184
4	Copper as Cu	mg/kg	<1.0	<1.0	<1.0
5	Cadmium as Cd	mg/kg	9.2	<1.0	<1.0
6	Cobalt as Co	mg/kg	<1.0	<1.0	<1.0
7	Lead as Pb	mg/kg	218.5	183.4	167.8
8	Nickel as Ni	mg/kg	<1.0	<1.0	<1.0
9	Arsenic as As	mg/kg	<0.5	<0.5	<0.5
10	Vanadium as V	mg/kg	18.6	19.2	10.7
11	Chromium as Cr	mg/kg	40.7	39.7	9.6
12	Moisture Content	%	11.81	5.81	6.1
13	Mercury as Hg	mg/kg	<1.0	<1.0	<1.0

73.2 Utilization Process

The LD/GCP Sludge, LD/GCP Classifier Sludge and Blast furnace flue dust collected from steel/ ferro alloy plants are mixed with other raw materials such as lime and cement in proportion. The mixed raw materials are fed in the Pelletizing Disc. The moisture content in the raw materials helps in binding and nodulizing the green agglomerates

The green agglomerates are loaded inside the chamber kiln and heated at 110° C for 3-4 hours. Then dry LD sludge agglomerates are pulled out from the chamber kiln and cooled in normal temperature under shed. After cooling the final product is ready for dispatching or stocking in stockyard.

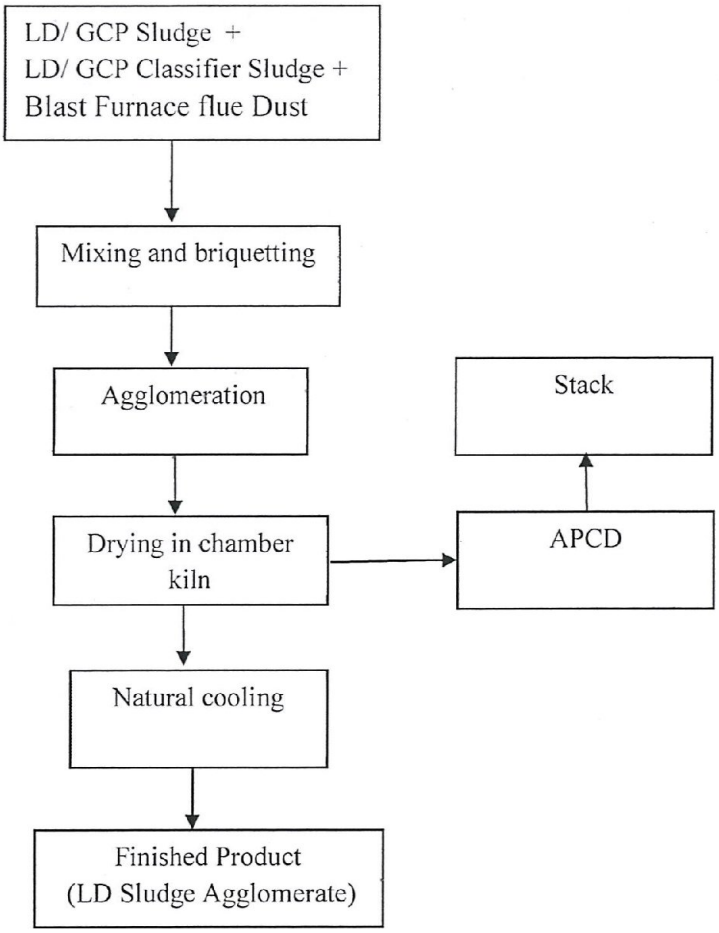

Figure: 1-*Process flow diagram for utilization of hazardous waste.*

73.3 Product Usage / Utilization

LD/GCP Sludge, LD/GCP Classifier Sludge and Blast furnace flue dust is utilized in the manufacturing of L.D. Sludge agglomerates which is used in steel making.

73.4 Standard Operating Procedure for utilization

This SoP is applicable only for Utilization of LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust for manufacturing L.D. Sludge agglomerates.

1) LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust 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) LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust shall be procured only in SPCB/PCC authorized barrels/closed tanks mounted over vehicles fitted with requisite safeguards ensuring no emissions/spillages.
3) LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust shall be stored in dedicated storage area with impervious floor under covered storage shed within premises.

Further, storage sheds shall have proper slope and seepage collection pit to collect seepage / floor washing. The collected seepage / floor washing shall be utilized in the process.

4) The unit shall ensure that while mixing with other raw materials, that no dust formation takes place by maintaining >15% moisture in the LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust.
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 emissions in process area through dust extraction system with APCD such as bag filter followed by stack.
7) The gases from kiln shall pass through APCD like Cyclone separator/ Bag filter/ Electro static precipitators to meet the prescribe 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, reactor washing, scrubber bleed shall be reused in the process while mixing raw materials or treated Physico-Chemically in an Effluent Treatment Plant (ETP) or may be sent to Common Effluent Treatment Plant (CETP) for final disposal or be treated further in a captive facility to comply with surface water discharge standards.
   In case of zero discharge, the treated waste water from ETP may be managed as per conditions stipulated by the concerned SPCB/PCC.
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 unit shall maintain proper ventilation in the work zone and process areas. All personnel involved in the plant operation shall wear proper personal protective equipment (PPE) specific to the process operations involved and type of chemicals handled as per Material Safety Data Sheet (MSDS). The safety precautions of the worker shall be in accordance with the Factory Act, 1948, as amended from time to time.
12) The hazardous wastes generated during utilization of LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust (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.
13) The unit shall ensure that the LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust is procured from authorized industries as required under HOWM Rules, 2016.
14) Transportation of LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust shall be carried out by sender (generator) or receiver (utilizer) only after obtaining authorization from the concerned SPCB/PCC under HOWM Rules, 2016. Requisite manifest document shall be followed as laid down under the said Rules.
15) Prior to utilization of LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust, the unit shall obtain authorization for storage, utilization and disposal of LD/GCP

Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust from the concerned SPCB/PCC under HOWM Rules, 2016.

16) 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.
17) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings.
18) 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.

73.5 Record/Returns Filing

1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each procurement of LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust 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 LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust, 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.

73.6 Standards

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

Particulate Matter	50 mg/Nm^3
NOx	150 mg/Nm^3
SO_2	250 mg/Nm^3

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

PM_{10}	40 mg/m^3
NOx	150 $\mu g/m^3$
SO_2	200 $\mu g/m^3$

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

73.7 Siting of Industry

Facilities for utilization of LD/GCP Sludge, LD/GCP Classifier Sludge and Blast Furnace Flue Dust 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.

73.8 Size of Plant and Efficiency of Utilisation

The yield of the product is around 90 % by using the raw materials during the trial run (L.D. Sludge, L.D. Classifier Sludge and Blast Furnace Flue Dust in the proportion 40%, 30% and 25% respectively).

73.9 On-line Detectors / Alarms / Analyzers

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

73.10 Checklist of Minimal Requisite Facilities:

Sl. No	Particulars
1.	Cool, dry well-ventilated covered sheds for LD/GCP Sludge, LD/GCP Classifier Sludge & Blast Furnace Flue Dust, process activities within premises and dedicated hazardous storage area for temporary storage of hazardous waste generated during utilization process
2.	Mixer, Pelletizer and Kiln.
3.	APCD like Bag filters/ Cyclone for fugitive emissions.
4.	APCD like Cyclone /Bag filter/ Electro static precipitators connected to kiln.

5.	Stack to have sampling port, platform, access to the platform etc. as per the guidelines on methodologies for source emission monitoring published by CPCB under Laboratory Analysis Techniques LATS/80/2013-14.
6.	Online analyzers for PM, SO_2 & NOx emission monitoring in the stack, in case of continuous process operations.

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