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 Converter gas cleaning sludge as a supplementary resource (alongwith Iron ore) in the manufacturing of Iron Ore Pellets





September, 2023

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

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

- 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 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.
 - f. Monitor closely the quantity of LD Converter gas cleaning sludge being sent by generators and the quantity being utilized by authorized facilities.
- 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.
- 8) SPCBs/PCCs shall ensure that the utiliser of LD Converter gas cleaning sludge shall maintain daily records ion National Hazardous Waste Tracking System (NHWTS) once operationalised by CPCB.

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

Type of HW	Source of generation	Recovery / Product
LD Converter gas cleaning	Generated during scrubbing	As a supplementary
Sludge - 35.1 of Schedule III	of off-gases in Gas Cleaning	resource in the
of HOWM Rules – 2016)	Plant (GCP) connected to	manufacturing of Iron
	(Linz Donawitz) LD	Ore Pellet
	converter in steel	ч.
	manufacturing process.	ц.

93.1 Source of Waste:

LD Converter gas cleaning sludge is generated as a result of cleaning the off gases from LD Converter during steel manufacturing process. Hot process gas exits from the LD converter during lancing of Oxygen, is laden with iron oxide dust particles and other particles from the slag, flux charge and the hot metal. The hot process gas is quenched and passed through venturi scrubber. The scrubbing water carries the removed dust to the water treatment facility comprising of flocculation and clarifier units. The settled sludge is passed through the filter press/vacuum drum-filter/etc. and LD Converter gas cleaning sludge cake is generated.

The above sludge is categorized as hazardous waste under category 35.1 of Schedule I of HOWM Rules 2016.

S. No	Parameter	Results
1.	Arsenic, As	0.37 mg/Kg
2.	Antimony, Sb	
3.	Cadmium, Cd	0.005 mg/Kg
4.	Chromium, Cr	0.255 mg/Kg
5.	Lead, Pb	0.095 mg/Kg
6.	Mercury, Hg	0.043 mg/Kg
7.	Iron, Fe	62.4 %
8.	Nickel, Ni	0.056 mg/Kg
9.	Zinc, Zn	0.6 mg/Kg
10.	Manganese, Mn	2.26 mg/Kg
11.	Cobalt, Co	0.006 mg/Kg
12.	Copper, Cu	0.373 mg/Kg
13.	Vanadium, V	0.077 mg/Kg
14.	Tin, Sn	0.008 mg/Kg

Table 1. Typical Characteristics of LD Converter gas cleaning sludge are given below:

93.2 Utilization Process of hazardous waste (LD Converter gas cleaning Sludge):

The process involves utilization of iron rich LD Converter gas cleaning sludge as a supplementary resource with iron ore fines to make iron pellets, suitable for charging to furnaces. Iron Ore fines charged into the ball mill through a belt conveyor and grinded. The slurry material from the grinder is thickened and send to the filter press where iron ore cake is generated.

Further iron ore cake, LD Converter gas cleaning sludge, bentonite (binding agent), dolomite (fluxing agent) & coke are mixed in the mixer. The mixture is then sent to the

balling area where the mixed material is agglomerated on balling disc Pelletizers into green (or unfired) pellets.

Green pellets of desired size are subjected to thermal treatment viz. drying, preheating, induration and cooling, during which the pellets attain adequate strength. Green pellets dried out in a drying section of traveling grate, and finally undergo induration at about 950°C to 1250 °C in the rotary kiln. The pellets are then cooled with the help of annular cooler. The finished products (i.e., Iron ore pellets) from the annular cooler is stored.



Figure: 1-Process flow diagram for utilization of LD Converter gas cleaning Sludge.

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93.3 Product Usage / Utilization

LD Converter gas cleaning sludge as supplementary resource (along with iron ore) in the manufacturing of Iron ore pellet, which will be further utilized in steel manufacturing industry.

93.4 Standard Operating Procedure for utilization of LD Converter gas cleaning Sludge:

This SoP is applicable only for the utilization of LD Converter gas cleaning sludge (generated during scrubbing off-gases in Gas Cleaning Plant connected to LD converter in steel manufacturing process) as supplementary resource (along with Iron ore) as a supplementary resource in the manufacturing of Iron Ore Pellet.

- 1) LD Converter gas cleaning sludge shall be procured only in SPCB/PCC authorized barrels/closed trucks mounted over vehicles fitted with requisite safeguards ensuring no emissions/spillages.
- 2) LD Converter gas cleaning sludge 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 or channelized to ETP for further treatment. LD Converter gas cleaning sludge and other raw materials shall be stored separately.
- 3) Utilization of LD Converter gas cleaning Sludge shall not exceed 35 % of the total raw material consumption for manufacturing of iron ore pellet.
- 4) The unloading, storage, crushing, transfer and other handling LD Converter gas cleaning sludge shall be carried out using mechanical means with minimal manual intervention in closed system.
- 5) The unit shall ensure control of fugitive emissions at material transfer points, mixing units and grinding units by adopting closed system, and also through dust extraction system with APCD such as bag filter.
- 6) The unit shall install Electro static precipitator (ESP) and Bag filter for cleaning of exhausting gases from travelling grate and rotary kiln. However, if ESP complies with the prescribed standards, Bag filter may not be not required. Further, in case of using furnace oil or any other high sulphur fuels, alkali scrubber shall be installed in addition to above said APCD system.
- 7) 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.
- 8) Wastewater generated from floor-washings, spillages, reactor washing, scrubber bleed shall be reused in the process while mixing raw materials or treated Physio-Chemically in an Effluent Treatment Plant (ETP). In case of zero discharge, the treated waste water from ETP may be managed as per conditions stipulated by the concerned SPCB/PCC.

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- 9) The treated effluent shall be discharged in accordance with the conditions stipulated in the Consent to Operate issued by concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974.
- 10) The 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 LD Converter gas cleaning sludge shall be collected and taken back to utilization process.
- 12) The unit shall ensure that the LD Converter gas cleaning sludge procured from the industries, which have valid authorization from the concerned SPCB/PCC as required under HOWM Rules, 2016.
- 13) Transportation of LD Converter gas cleaning 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 LD Converter gas cleaning 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) 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.

93.5 Record/Returns Filing

- 1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each procurement of LD Converter gas cleaning 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

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- 2) A log book with information on source and date of procurement of LD Converter gas cleaning 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.
- 5) The unit shall use NHWTS to manage the manifest, enter daily records of quantity generated, disposed, etc. once the portal is operational.

93.6 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;

50 mg/Nm^3

- 2) In addition to the above, the concerned SPCB shall prescribe the standards for the necessary parameters in accordance with EP(A) Rules, 1986.
- 3) Work zone emission in the work zone area shall comply with the following standards:

PM10	5 mg/m ³ TWA* (PEL)
SO ₂	13 mg/Nm3 TWA* (PEL)
NO _x	9 mg/Nm3 #

*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.

- 4) Monitoring of the above specified parameters for Source emissions and 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.
- 5) 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.

93.7 Siting of Industry

Facilities for utilization of LD Converter gas cleaning 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.

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93.8 Size of Plant and Efficiency of Utilisation

This SoP is applicable for the utilization of LD Converter gas cleaning sludge shall not exceeding 35 % of the complete raw material consumption. Therefore, requisite facilities of adequate size of storage shed and other plant & machineries shall be installed accordingly.

93.9 Online detectors/ Alarms/ Analyzers

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

93.10 Checklist of Minimal Requisite Facilities:

Sl. No	Particulars
1.	Cool, dry well-ventilated covered sheds for LD Converter gas cleaning Sludge and
	process activities within premises and dedicated hazardous storage area for
	temporary storage of hazardous waste generated during utilization process
2.	Mechanized and closed systems for handling & transfer of LD Converter gas
	cleaning Sludge
3.	Grinding equipment, Filter press, Mixer, Disc Pelletizer, Grate, Rotary Kiln and
s.	Annular Cooler.
4.	Dust extraction system with APCD like Electro static precipitators/ Bag filters/
	Cyclone for fugitive emission.
5.	The unit shall install Electro static precipitator Electro static precipitator (ESP) and
	Bag filter for cleaning of exhausting gases from travelling grate and rotary kiln.
	However, if ESP complies with the prescribed standards, Bag filter may not be not
	required. Further, in case of using furnace oil or any other high sulphur fuels, alkali
	scrubber shall be installed in addition to above said APCD system.
6.	Stack to have sampling port, platform, access to the platform etc. as per the
	guidelines on methodologies for source emission monitoring published by CPCB
	under Laboratory Analysis Techniques LATS/80/2013-14.
7.	Online analyzers for PM emission monitoring in the stack, in case of continuous
	process operations.

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