

**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 (from dephenolization treatment of the wastewater generated from phenol manufacturing plant) as supplementary fuel along with coal in boiler**



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**Central Pollution Control Board  
(Ministry of Environment, Forest & Climate Change,  
Government of India)  
Parivesh Bhawan, East Arjun Nagar,  
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**Procedure for grant of authorization by State Pollution Control Boards (SPCBs)/Pollution Control Committees (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 on utilization 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 i.e. ETP Sludge for utilization.
  - f. Monitor closely the quantity of ETP sludge being generated from phenolic compound manufacturing industry and the quantity being utilized as supplementary fuel in fluidized bed boiler authorized under HOWM Rules, 2016.
- 2) After issuance of authorization, SPCBs/PCCs shall verify the compliance of checklist and SoP on quarterly basis for initial 1 year; followed by random checks during subsequent period for atleast once a year. The compliance reports may be submitted to CPCB.
- 3) In-case of lack of requisite infrastructures with the SPCBs/PCCs, they may engage 3<sup>rd</sup> 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.
- 5) Authorization for utilization 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 (if ant generated during utilization) or its complete utilization or arrangement for transfer to 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 utilizer of ETP sludge shall maintain daily records in National Hazardous Waste Tracking System (NHWTS).

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**101.0 Utilization of ETP sludge:**

Type of HW	Source of generation	Recovery/Product
ETP sludge (Category 35.3 of Schedule I of HOWM Rules, 2016)	Dephenolization Treatment of the wastewater generated from phenol manufacturing plant.	To be utilized as supplementary fuel in fluidized bed boiler along with coal of capacity 100TPH steam generation or above.

**101.1 Source of Waste**

The ETP sludge is generated from the de-phenolization treatment of the wastewater generated from phenolic compounds manufacturing industry. This ETP sludge is categorized as hazardous waste at S. no. 35.3 of Schedule-I of HOWM Rules, 2016, that can be utilize as energy resource in Boiler.

**Table: 1- Criteria characteristics of ETP sludge is given below:**

Parameters	Results	Unit
Moisture Content	10	%
pH	8.22	-
Calorific Value	2558	Kcal/Kg
Loss on Ignition	45.34	%
Chlorine	0.03	(% by mass)
Carbon	30.19	%
Hydrogen	1.22	%
Sulphur	1.84	%
Nitrogen	2.18	%
Ash Content	44.59	%
TOC	42.31	%
Manganese as Mn	0.73	mg/L
Nickel as Ni	0.18	mg/L
Zinc as Zn	9.80	mg/L

**101.2 Utilization Process**

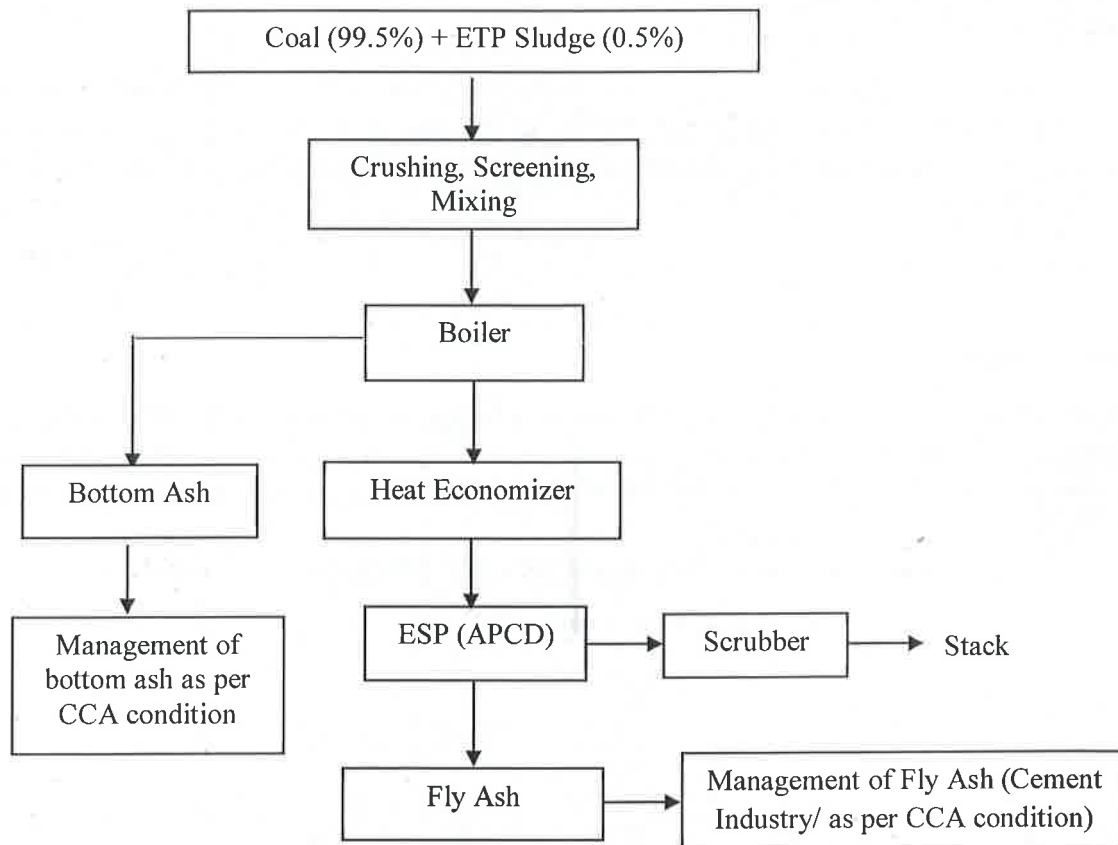
**Mixing & Feeding mechanism of ETP sludge & Coal:**

The ETP sludge is transferred to coal storage yard where it will be mixed with coal, which undergoes crushing, grinding and sieving and sent through closed conveyer system connected to storage silos before feeding to the boiler.

*Coal (99.5%) + ETP sludge (0.5%) → Grizzly Hopper → Conveyor belt → Primary screen → Crusher → screen (6 mm) → Coal Bunker/Silo → Boiler.*

The mixture of ETP sludge & coal (in the ratio of 0.5:99.5) is fed through mechanised system into fluidized bed boiler (for energy recovery). The flue gases from boiler pass through heat economizer followed by pollution control measures such as Electro Static Precipitator (ESP)/bag filters, in addition to alkali scrubbers before dispersion into atmosphere through stack.

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**Figure: 1-Process flow diagram for utilization of ETP sludge along with coal in boiler.**

### 101.3 Standard Operating Procedure for utilization

This SoP is applicable only for utilization ETP sludge (generated from de-phenolization ETP for wastewater generated from phenolic compound manufacturing industry) along with coal for energy recovery in boiler. The de-phenolized ETP Sludge shall be procured only in closed trucks with requisite safeguards guards for transfer of Hazardous waste. Closed cart or mechanised systems to be used in case of captive utilization.

- 1) The dry ETP sludge shall be stored in under covered storage shed(s) within premises, as authorized by the concerned SPCB/ PCC under HOWM Rules, 2016, so as to eliminate rain water intrusion. The storage area shall be cool, dry, well ventilated.
- 2) Transfer of ETP sludge from storage shed shall be carried out through mechanical conveyer to hopper/mixing unit where ETP sludge shall be crushed, grinded & mixed with coal and then stored in silo before feeding in boiler. The mixing area shall have dust extraction system connected with pulse jet bag filter, to minimize the possibility of fugitive emission.
- 3) Uniform mixing of coal (99.5%) and ETP sludge (0.5%) shall be achieved by appropriate mechanized mixing units. The facility should have pulverization unit for ETP sludge and coal mixing.
- 4) Utilization of ETP sludge shall not exceed 0.5% of the coal consumed in the fluidized bed combustion boiler.
- 5) Utilization shall only be permitted in fluidized combustion bed boiler and the temperature of flue gases in boiler shall be maintained at not less than 850°C for at least 1 second duration.

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- 6) The minimum capacity of boiler to be 100 TPH of steam generation which shall be used in industrial operation including Captive Power generation.
- 7) The hot flue gases shall be passed through heat economiser and then Electrostatic Precipitator (ESP) /Bag filters followed by Alkali Scrubber and Activated carbon treatment, for control of gaseous emissions.
- 8) The treated gases/fumes 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) It shall be ensured that the ETP sludge is procured from the industries, which have valid authorization from the concerned SPCB/PCC as required under HOWM Rules, 2016.
- 10) Transportation of ETP sludge 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.
- 11) Prior to utilization of ETP sludge, the unit (utilizing the hazardous waste) shall obtain authorisation for generation, storage and utilization of ETP sludge from the concerned SPCB/PCC under HOWM Rules, 2016.
- 12) The unit shall submit quarterly and annual information on ETP sludge generated, procured, utilized, resources conserved (specifying the details like type & quantity of resources conserved) to the concerned SPCB/PCC. Further the unit shall also submit quarterly analysis report of ashes generated during utilization of ETP sludge for initial one year.
- 13) The unit shall maintain proper ventilation in the work zone of blending, crushing, screening 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.
- 14) 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.
- 15) The unit shall provide suitable fire safety arrangements, flame proof electrical fittings and on site emergency plan approved by concerned agency.
- 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.

#### **101.4 Product Usage / Utilization**

Sludge from de-phenolization ETP, shall be used along with coal for energy recovery in the boiler for steam generation which shall be used in industrial operation including captive power generation.

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**101.5 Record>Returns Filing**

- 1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each generation/ procurement of ETP sludge as mentioned below:
  - a. Address of the sender
  - b. Date of dispatch
  - c. Quantity procured
  - d. Seal and signature of the sender
  - e. Date of Receipt in the premises
- 2) A logbook with information on source and date of generation/ 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 Rule20(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.

**101.6 Standards**

- 1) Source emissions from the stack connected to Air Pollution Control Measures such as ESP/Bag filters followed by alkali scrubbers, of boiler furnace shall comply with the following standards or as prescribed by the concerned SPCB/PCC, whichever is stringent;

PM	As prescribed by the concerned SPCB/PCC
SO <sub>2</sub>	
NO <sub>x</sub>	
TOC	20 mg/Nm <sup>3</sup>
PCDDs	0.1 ng TEQ/Nm <sup>3</sup> (at 11% O <sub>2</sub> )

- 2) Fugitive emission in the work zone of grinding, mixing and screening shall comply with the following standards:

PM <sub>10</sub>	:	5 mg/m <sup>3</sup> TWA* (PEL)
HCl vapour mist	:	35 mg/m <sup>3</sup> TWA* (PEL)

*\*PEL: Permissible Exposure Limit*

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

- 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

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Water (Prevention and Control of Pollution) Act, 1974. In case of (i) zero discharge as per consent or (ii) non-availability of Common Effluent Treatment Plant (CETP), the unit shall achieve zero discharge by setting up adequate captive treatment facility.

**101.7 Siting of Industry**

The siting criteria shall not applicable as the industry intends to utilize ETP sludge in their existing boiler.

**101.8 Size of Plant and Efficiency of Utilization**

This SOP is applicable to all fluidized bed combustion boilers with minimum capacity of boiler to be 100 TPH of steam generation and be used in industrial operation including Captive Power generation irrespective of size of industrial plant. Hence, requisite facilities of adequate size shall be installed accordingly.

**101.9 On-line detectors / Alarms / Analysers**

In case of continuous process operations, online emission analysers for PM, SO<sub>2</sub>, NO<sub>x</sub> and TOC in the stack shall be installed and the online data be connected to the server of the concerned SPCB/PCC and CPCB.

**101.10 Checklist of Minimal Requisite Facilities**

S. No.	Particulars
1	Cool, dry well-ventilated covered storage shed(s) for ETP sludge of adequate capacity to store ETP sludge of at least two weeks requirement.
2	The process area for crushing, blending, grinding, screening operations shall have proper ventilation
3	Closed Conveyor belt along with the pulse jet bag filter installed with crusher for coal & ETP sludge transfer.
4	Pulverization units for crushing and appropriate equipment for grinding and mixing.
5	Dedicated storage area for handling of bottom ash & fly ash.
6	Fluidized bed combustion boilers with minimum capacity of boiler to be 100 TPH of steam generation.
7	Electrostatic Precipitators or Bag Filters (APCD) and Alkali Scrubber.
8	In case of captive sludge generation, ETP shall comprises of Dephenolization process.
9	The air pollution control device shall have arrangement for treating the flue gases with injection of lime and activated carbon for control of Dioxin and furan.
10	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.

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