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 secondary clarifier) as fuel in recovery boiler

December, 2020

Central Pollution Control Board

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

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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 on 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 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 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/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.

59.0 Utilization of ETP sludge from secondary clarifier:

Type of HW	Source of generation	Recovery/Product
ETP / Process sludge (Category 35.3 of Schedule I of HOWM Rules, 2016)	Secondary clarifier of ETP.	As a fuel in recovery boiler.

59.1 Source of Waste

The sludge is generated from secondary clarifier of ETP is categorized as Hazardous waste at S. No. 35.3 of Schedule I of HOWM Rules, 2016, that can be utilise as energy resource in Recovery Boiler.

Characteristics of sludge from secondary clarifier are given below:

Parameters	Results	Unit
Total Moisture	78.3	(% by mass)
Ash	30.5	(% by mass)
Volatile Matter	69.1	(% by mass)
Chlorine	0.03	(% by mass)
Carbon	7.65	%
Hydrogen	0.51	%
Sulphur	0.13	%
Nitrogen	0.11	%
Oxygen	2.30	%

59.2 Utilization Process

The utilization process of ETP Sludge involves pumping from secondary clarifier to Centrifuge for thickening. To increase the consistency or to promote thickening polymer may be added at the inlet of centrifuge along with secondary sludge. The thickened sludge (consistency upto 20%) shall mixed with black liquor and agitated in intermediate mixing tank (IMT). Temperature of IMT shall be maintain at around 100 °C. This IMT tank liquor of 52% dry solids at around 100 °C is partly transferred Recovery boiler ash mixing tank where ESP dust, salt cake (Na_2SO_4) are added and sent back to IMT and partly going to feed at Finisher effect (1st Effect) inlet as existing procedure to achieve the final Heavy Black Liquor (HBL) concentration i.e., 75% dry solids at temperature of about 120 °C. This HBL is stored for 3-4 hours of retention time at 120 °C. From storage tank, HBL shall be send to Recovery boiler for firing purpose through pumping system. HBL is fired in the Liquor fired boiler furnace through liquor spray guns.

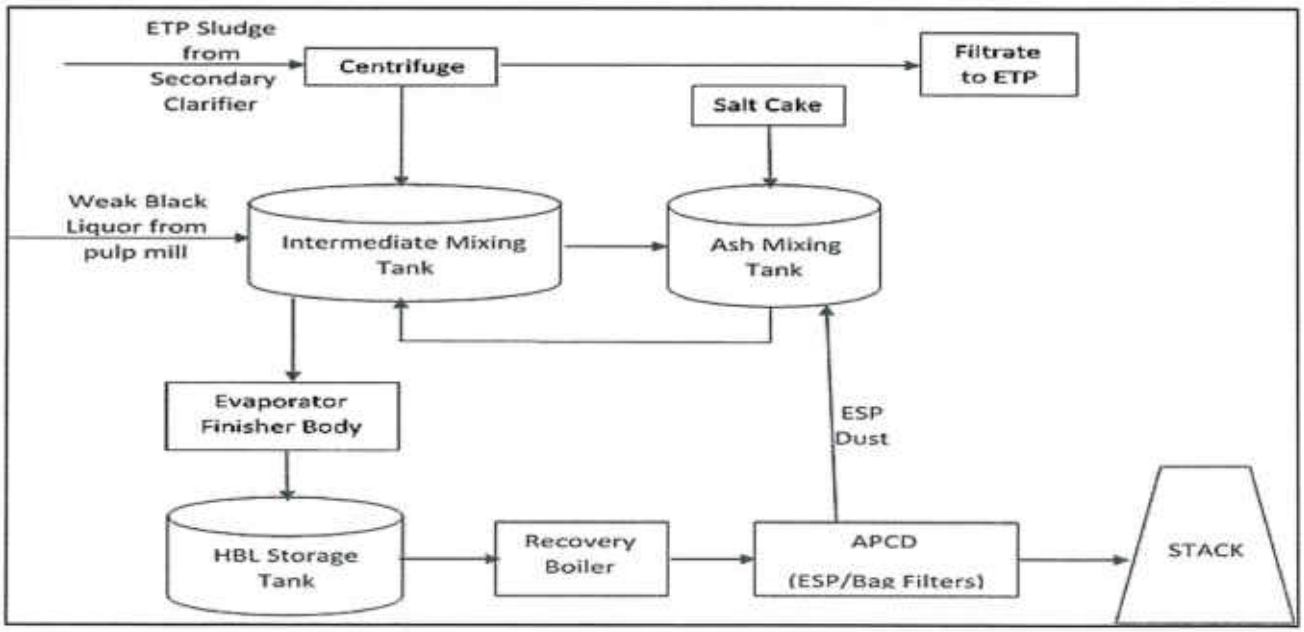

Figure: 1-*Process flow diagram for utilization of ETP sludge from secondary clarifier.*

59.3 Product Usage / Utilization

The secondary sludge of 2 Tons dry solids/1300 Tons of HBL per day shall be used as energy resource in Liquor fired recovery boiler, which will avoid landfilling of secondary sludge.

59.4 Standard Operating Procedure for utilization

This SoP is applicable only for utilization of ETP sludge generated from secondary clarifier unit of ETP with black liquor generated from pulp and paper industry as energy resource in Liquor fired Recovery boiler.

1) The dewatered ETP sludge from secondary clarifier shall be collected and stored in pits under 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 shall have adequate slope to collect spillage, if any, and the spillage shall be transferred to ETP inlet.

2) The handling of hazardous waste shall be carried out using mechanical means with minimal manual intervention.

3) Transfer of secondary sludge from storage shed or directly from secondary clarifier and Black liquor shall be transferred through completely enclosed pumping/mechanical conveyor system, to eliminate the possibility of fugitive emission.

4) Utilization of secondary sludge shall not exceed 0.15% of the black liquor consumed in recovery boiler.

5) Polymer may be used for the thickening of sludge.

6) Uniform mixing of secondary sludge and black liquor shall be achieved using mechanised mixing unit (such as intermediate mixing tank) where appropriate temperature of around 100 °C shall be maintained for keeping the consistency of mixture.

7) ESP Dust of boiler furnace shall be reused and salt cake (Na_2SO_4) be mixed in separate mixing unit by partly transferring previous mixing tank liquor of 50% dry solids.

8) Multiple Effect Evaporator shall be used to achieve final 75% of dry solids concentration i.e., Heavy Black Liquor.

9) This Heavy Black liquor shall be stored in a storage tank at 120 °C provided that 3-4 hours of retention time shall be allowed in storage tank.

10) The Heavy Black liquor shall have gross calorific value equal or more than 3000 Kcal/Kg.

11) The Recovery Boiler shall maintain the temperature not less than 1100 °C.

12) Utilization of secondary sludge shall not be carried out during un-stable/breakdown conditions in the boiler.

13) The hot flue gases shall be passed through heat economiser (optional) and treated in Electrostatic Precipitator (ESP) or bag dust collectors connected to stack of height as prescribed by SPCB

14) 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.

15) 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.

16) Prior to utilization of ETP secondary sludge, the unit shall obtain authorisation for generation, storage and utilization of ETP secondary sludge from the concerned State Pollution Control Board under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.

17) 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.

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

19) 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.

59.5 Record/Returns Filing

1) A log book with information on source, quantity, date wise utilisation of ETP secondary sludge 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 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.

3) 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.

59.6 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;

PM : 100 mg/Nm^3
SO_2 : 200 mg/ Nm^3
NOx : 400 mg/Nm^3
CO : 100 mg/Nm^3

} Or any stringent standards as prescribed by SPCB/PCC

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

PM_{10}	:	5 mg/m^3 TWA* (PEL)
HCL vapour mist	:	35 mg/m^3 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 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.

59.7 Siting of Industry

This SoP is applicable only for captive utilization of ETP secondary sludge in an existing recovery boiler of pulp and paper industry and cited in accordance with Consent to Establish issued by the concerned SPCB/PCC.

59.8 On-line detectors / Alarms / Analysers

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

59.9 Checklist of Minimal Requisite Facilities

Sl. No.	Particulars
1	Covered storage shed of adequate capacity to store ETP secondary sludge of at least two weeks requirement but preferably for 30 days.
2	Cool, dry well-ventilated covered storage shed(s) for ETP secondary sludge storage, other raw materials/chemical storage and process activities within premises.
3	Enclosed pumping/mechanized conveyer system for handling and transfer of ETP secondary sludge from storage area to centrifuge and mixing unit.
4	Centrifuge, Mixing Units & Evaporators.
5	Storage tank for Heavy Black Liquor.
6	Recovery Boiler furnace with liquor spray gun.
7	Electrostatic Precipitators or 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.

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