# 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 of fertilizer industry in manufacturing of Di-Ammonium Phosphate (DAP)/NPK Fertiliser


**December, 2021**

**Central Pollution Control Board**

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

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**Procedure for grant of authorization by State Pollution Control Boards (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 utilization have been circulated by Central Pollution Control Board (CPCB) ensuring the following:

   a. The waste (intended for utilization) should have similar source of generation as specified in SoP.
   b. The utilization shall be similar to as described in SoP.
   c. End-use / product produced form 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 the passbooks issued for recycling of used oils, waste oil, non-ferrous scraps, etc.) for maintaining records of receipt of hazardous wastes for utilization.

2) After issuance of authorization, SPCB shall verify the compliance of checklist and SOPs on quarterly basis for initial 02 years; followed by random checks in subsequent period for at least once in 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 SoP 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 a half yearly basis i.e. by July and January respectively.

5) Authorization for utilization shall not be given to the units located in the State/UT where there is no Common TSDF, unless the unit ensures authorized captive disposal of the hazardous waste (generated during utilization) or its complete utilization or arrangement of sharing with any other authorized 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 SoPs are based on the E(P)A notified and OSHA standards respectively, however, SPCBs/PCCs may impose more stringent standards based on the location or process specific conditions.

## 76.0 Utilization of ETP Sludge:

| Type of HW | Source of generation | Recovery/Product |
|---|---|---|
| ETP sludge (Category 35.3 of Schedule I of HOWM Rules, 2016) | Effluent Treatment Plant (ETP) of Fertilizer industry | As a partial substitute for filler in manufacturing of Di-Ammonium Phosphate (DAP)/ NPK Fertilizer |

### 76.1 Source of Waste

The ETP sludge is generated from sludge thickener during effluent treatment of fertilizer industry. 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 as resource recovery.

**Table 1:- Heavy metal analysis of ETP Sludge:**

| Parameters | Results | |
|---|---|---|
| | mg/Kg | TCLP (mg/L) |
| Arsenic | <1.0 | <0.05 |
| Barium | 2.0 – 14.0 | 0.1 – 0.8 |
| Cyanide | <1.0 | <0.05 |
| Cadmium | <1.0 | <0.05 |
| Chromium | 2.0 – 8.0 | 0.1 – 0.4 |
| Lead | <1.0 | <0.05 |
| Copper | <0.05 – 1.60 | <0.05 – 0.8 |
| Nickel | 2.40 – 3.60 | 0.12 – 0.18 |
| Zinc | 87.0 – 146.40 | 4.35 – 7.32 |
| Mercury | <1.0 | <0.05 |

### 76.2 Utilization Process

In dry sludge case, the ETP sludge required to be prepare in slurry form. Uniform slurry preparation achieved in sump pit with agitator. This slurry or ETP sludge from sludge thickener with 5 – 10% solid in slurry is transferred to Ammonia scrubber of both, DAP/NPK plants in a closed loop system by using pumps.

The Ammonia scrubber receives raw material i.e. Phosphoric acid and water which is further reacted with $NH_3$ for formation of product (DAP/NPK) in presence of sulfuric acid which maintains correct $N:P_2O_5$ of granular product.

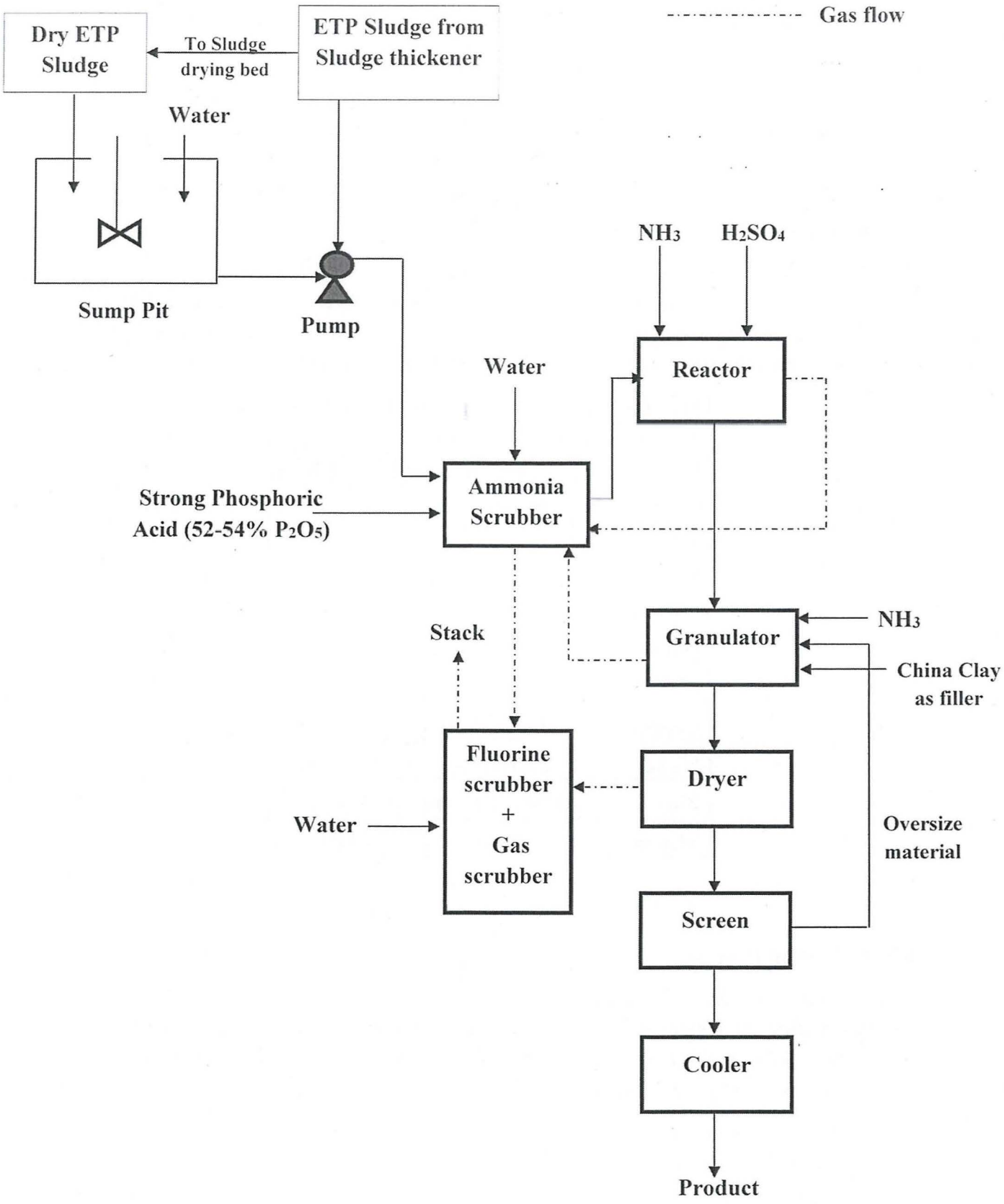


**Figure 1:** Process flow diagram for utilization of ETP sludge for manufacturing of DAP/ NPK Fertilizer

### 76.3 Product Usage / Utilization

The ETP sludge will be utilized as partial substitute for the clay filler in the production of DAP/ NPK Fertilizer.

Final products manufactured utilizing above said hazardous waste shall meet the specifications mentioned in Fertilizer Control Order, 1985 and amendments thereof.

The unit shall label its product (i.e. DAP/NPK Fertilizer) manufactured by utilizing aforesaid Hazardous waste as "This Di-Ammonium Phosphate / NPK Fertilizer has been manufactured by utilizing ETP sludge, generated during effluent treatment of fertilizer industry."

### 76.4 Standard Operating Procedure for utilization

This SoP is applicable only for the captive utilization of ETP sludge generated during effluent treatment of fertilizer industry.

1) The ETP sludge (5-10% solid of slurry) generated from sludge thickener of ETP shall be transferred through pump to ammonia scrubber of DAP/NPK plant by pump ensuring no manual intervention.

2) In case of dry sludge, the waste shall be first sent to a sump pit with agitator for preparation of slurry. The uniform slurry once formed shall be transferred to ammonia scrubber of DAP/NPK plant by pump.

   There shall be a designated space for ETP sludge drying with concrete floor. The transfer of sludge to sump pit shall be through mechanized system i.e. conveyer belt with minimal manual intervention. In case of manual transfer of sludge to sump pit proper personal protective equipment (PPEs) such as mask, gloves, safety shoes and helmet shall be provided to the workers.

3) ETP sludge storage area shall be designated and provided with caution sign. 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.

4) Utilization of ETP sludge shall not exceed 3.5 % of total raw material on dry basis as partial substitute of clay filler.

5) A scrubber shall be connected to reactor and granulator from where NH3 may be liberated.

6) The other units such as dryer, cooler and dust collector system shall be connected with cyclones followed by scrubber.

7) The unit shall ensure segregation of oily and non-oil sludge and only non-oil sludge to be utilized.

8) The unit shall ensure final product meet the prescribed standards as per FCO, 1985 and amendments thereof.

9) The treated gases shall comply with emission norms prior to dispersion into atmosphere through stack. The stack height shall be a minimum of 30 m from ground level or as prescribed by the concerned SPCB/PCC, whichever is higher.

10) Treatment and disposal of wastewater:

Waste water generated from floor-washings, spillages, reactor washing, etc. shall be treated Physico-Chemically in an ETP so as to comply with inlet standards prescribed in case of CETP or be treated in captive ETP having adequate treatment facilities to comply with surface water discharge standards as stipulated in the Consent issued by the SPCBs/PCCs.

In case of zero discharge condition, the treated waste water from ETP may be managed as per conditions stipulated by the SPCB/PCC.

11) The hazardous wastes generated (if any) during utilization process shall be collected and temporarily stored in non-reactive drums 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 shall be done under covered storage area with proper ventilation.

12) Prior to utilization of ETP sludge, the unit shall obtain authorization for generation, storage, and utilization from the concerned SPCB/PCC under HOWM Rules 2016.

13) The unit shall maintain proper ventilation in the work zone and process areas. All personnel involved in the plant operation shall wear proper PPEs specific to the process operations involved and type of chemicals handled as per 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 and flame proof electrical fittings.

16) During the process of utilization and handling of hazardous waste, the unit shall comply with requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

### 76.5 Record/Returns Filing

1) The unit shall maintain a passbook issued by the 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 generation/procurement of ETP sludge, quantity, date wise utilization of ETP sludge, quantity of DAP/ NPK Fertilizer manufactured, hazardous waste generation and its disposal, etc. shall be maintained including analysis report of 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 annual returns in Form 4 as per Rule 20 (1) and (2) of HOWM Rules, 2016.

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.

### 76.6 Standards

1) Source emission monitoring from the common stack attached to scrubber shall comply with the following emission standards or as prescribed by the concerned SPCB/PCC, whichever is stringent;

| | |
|---|---|
| PM | 150.0 mg/$Nm^3$ |
| Ammonia | 300.0 mg/$Nm^3$ |
| Total Fluoride | <10 mg/$Nm^3$ |
| $H_2SO_4$ Mist | 50.0 mg/$Nm^3$ |
| HF | 4 mg/$Nm^3$ |

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

| | |
|---|---|
| $PM_{10}$ | 5.0 mg/$m^3$ TWA* |
| Ammonia | 35.0 mg/$m^3$ TWA* |
| $H_2SO_4$ mist | 1.0 mg/$m^3$ #Ceiling limit |
| Fluoride | 2.5 mg/$m^3$ |
| $SO_2$ | 13 mg/$m^3$ |
| $NO_x$ | 9 mg/$m^3$ |

**PEL - Permissible Exposure Limit; # - Ceiling 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 specified parameters for source emission shall be carried out quarterly for the 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) Special Condition: Analysis of final products w.r.t. metals and other parameters, as prescribed for compost under Municipal Solid Waste (MSW) Rules, 2016, shall be carried out in every three months and be submitted to CPCB and concerned SPCB/PCC. In case, parameters exceed prescribed limit, utilization shall be stopped and intimate to CPCB and concerned SPCB/PCC.

### 76.7 Siting of Industry

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

### 76.8 Size of Plant & Efficiency of utilization

Up-to maximum 3.5 % i.e. approximately 2.0 Kg ETP sludge per 25-40 Kg of clay filler as partial substitute along with other raw material may produce 1 Metric Tonne of DAP/ NPK Fertilizer. Therefore, requisite facilities of adequate size of storage shed and other plant & machinery as given in para 76.10 below shall be installed accordingly.

### 76.9 On-line detectors / Alarms / Analysers

Online emission monitoring systems shall be installed in case of continuous process operations for PM, F and $H_2SO_4$ mist as prescribed by the SPCBs/PCCs.

### 76.10 Checklist of Minimal Requisite Facilities

| Sl. No | Particulars |
|---|---|
| 1. | Cool, dry, well-ventilated ETP sludge storage area with caution sign and low raise bund wall with slope to collect spillages, if any, into collection pit. |
| 2. | Sump pit with agitator (in case of dry sludge utilization). |
| 3. | Mechanized system for transfer of ETP sludge from storage area to sump pit and motor pump for transfer to DAP/NPK plant. |
| 4. | Reactor, Granulator & Dryer |
| 5. | Ammonia Scrubber, Gas and Fluorine scrubber |
| 6. | De-dust system and cyclones for dust collection. |
| 7. | Suction arrangement to channelize emissions from pre neutralization reactor, granulator, dryer, cooler and dust collector system to APCD and finally to the common stack of height as prescribed by the SPCBs/PCCs. Scrubber shall be install at all these units and cyclone prior to scrubber shall be install in case of dryer, cooler and dust collector system. |
| 8. | Effluent treatment plant. |
| 9. | Common 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. |
| 10. | Dedicated hazardous waste storage area for temporary storage of hazardous waste generated during utilization process. |

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