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 Tarry residue waste & Coal Tar Sludge for Production of Naphthalene Oil, Creosote Oil (Heavy & Light), Anthracene Oil and Coal Tar Pitch

(REVISED)

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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) Utilization of Tarry residue generated from Coal Gasifier Units for production of Creosote Oils and Coal Tar Pitch is provisionally released by Central Pollution Control Board (CPCB). This Standard Operating Procedures (SoP) may be withdrawn/amended by CPCB at any point of time as per the direction of the Hon'ble Tribunal/Courts or in the interest of environment protection, if considered necessary.

2) This SoP shall abide the judgements/orders of the Hon'ble National Green Tribunal (NGT) in the Original Application No. 20/2017 (WZ) (M. A. No. 344/2017 & M. A. No. 91/2018) and other concerned matters listed in its order dated 06.03.2019.

3) SPCBs/PCCs shall ensure the compliance of any recommendations by oversight committee formed by Hon'ble NGT for handling and management of tarry residue generated from coal gasifiers. In case of difference in recommendations of committee and provisions laid down in this SoP for generation, handling, transportation, utilization and disposal of hazardous wastes, the case shall be referred to CPCB for consideration.

4) While granting authorization for utilization of hazardous wastes, SPCBs/PCCs shall ensure that authorization is given only to those wastes for which SoPs for utilization 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 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 the passbooks issued for recycling of used oil, waste oil, non-ferrous scrap, etc.) for maintaining records of receipt of hazardous wastes for utilization.

5) 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. The compliance report shall be submitted to CPCB by July every year.

6) 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.

7) 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/PCC website, periodically. Such updated list shall be sent to CPCB on a half yearly basis i.e., by July and January respectively.

8) 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 authorised captive disposal of the hazardous waste (generated during utilization) or its complete utilization or arrangement of sharing with any other authorised disposal facility.

9) 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 utilization studies and developing SoPs thereof.

10) The source and work zone standards suggested in the SoPs 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.

52.0 Utilization of hazardous wastes:

Name of HW	Category of waste	Source of generation	Recovery/Product
Coal Tar Sludge	Category 35.1 - Schedule I of HOWM Rules, 2016	ESP attached to electrode baking furnace in carbon block manufacturing	As a supplementary resource for production of Naphthalene Oil, Creosote Oil (Heavy & Light), Anthracene Oil and Coal Tar Pitch.
Tarry residue waste		Coal Gasifier units	

52.1 Source of Waste

The tarry residue waste is generated from gas cleaning unit (wet ESP) of coal gasifier plants where coal is gasified to produce coal gas and the coal tar sludge is generated during the baking process of the green blocks. Some pitch volatile fractions are vaporized and get condensed and then settle down in tar tanks attached to the ESP system as coal tar sludge. These wastes are categorized as Hazardous waste at S. No. 35.1 of Schedule I of HOWM Rules, 2016 which are required to be disposed in authorized disposal facility in accordance with authorization condition, when not utilized as energy/resource recovery.

Table 1:- Characteristics of Tarry residue & Coal Tar Sludge are given below:

S.no.	Parameters	Tarry residue	Coal Tar Sludge
1.	Moisture %	19-22	18.05
2.	Colour	Black	Dark Black
3.	Physical State	Semisolid/Thick viscous liquid	Thick viscous semisolid
4.	Calorific value Kcal/Kg	>6000	8000
5.	PAH %	0.24 - 0.27	0.25
6.	TCLP-CN mg/l	0.002 – 0.0001	0.0018
7.	Ammonia as NH_3 mg/kg	960 – 1291	1040
8.	Carbon %	64 – 67	65.30
9.	Hydrogen %	6.60 – 7.00	6.85
10.	Nitrogen %	0.12 – 0.28	0.18
11.	Sulphate %	0.73 – 0.97	0.76

52.2 Utilization Processes

A. **Utilization process of Tarry Residue**: The process involves pre-treatment of tarry residue for removal of moisture followed by vacuum distillation at different temperature for the production of creosote oils and coal tar pitch. In pre-treatment tank the tarry residue is heated at 60-80°C using thermic fluid heater. The de-watered coal tar from pre-treatment tank is transferred to vacuum distillation unit where tarry residue is further heated to produce Light Creosote Oil (at temperature range of 120-200°C), Heavy Creosote (at temperature range of 200-240°C) and Coal Tar Pitch (at the temperature range of 240-300°C).

B. **Utilization process of coal tar sludge:** The process involves mixing of above coal tar sludge with crude coal tar (generated from coke oven plant) in the ratio of 5:95 in a mixing tank. Process consists of mixing coal tar sludge (5%) with crude coal tar (95%) in a blending tank and mixture is pumped to the distillation vessel where the mixture is heated to remove moisture content, once the dehydration is completed mixture is distillate through vacuum distillation process to recover naphthalene oil & light creosote oil (at 180-270 °C), heavy creosote oil & anthracene oil (at 270-320 °C) and coal tar pitch (at 320-340 °C).

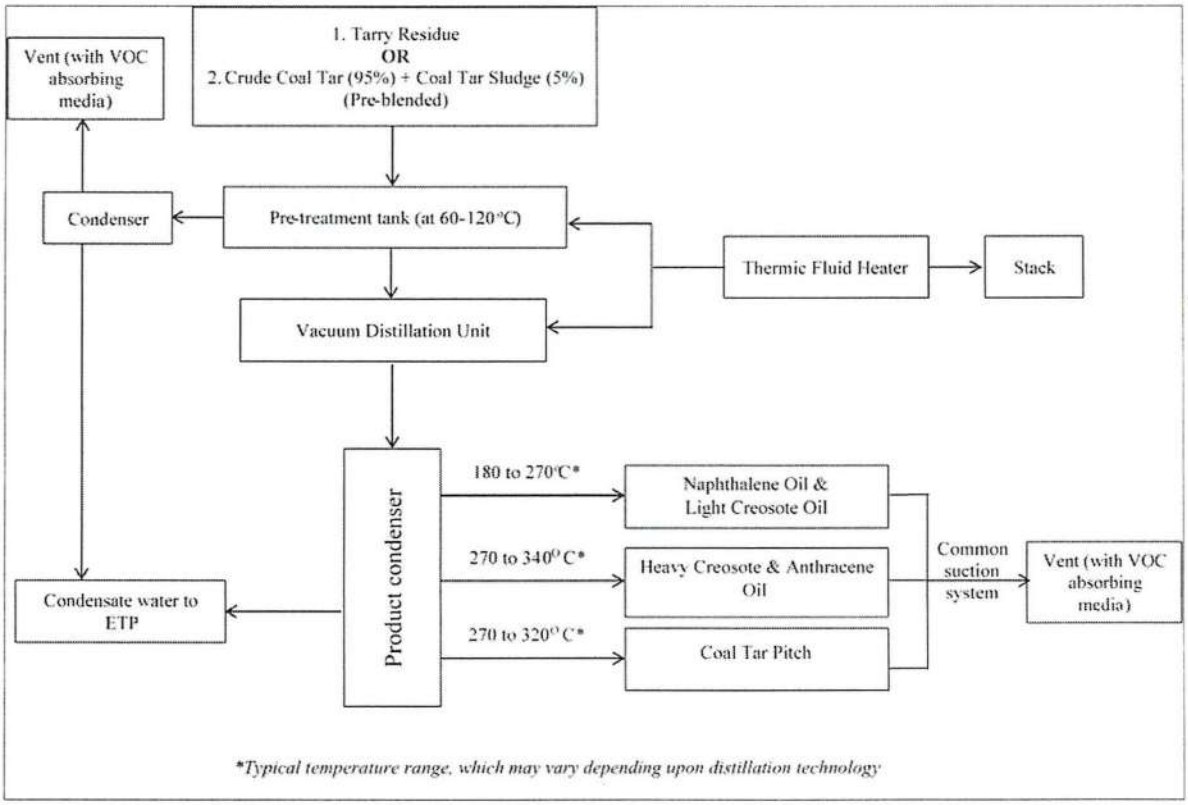

Figure 1:- ***Process flow diagram for utilization of Tarry residue waste & Coal Tar Sludge.***

52.3 Product Usage / Utilization

i. Tarry Residue **or** ii. Coal tar sludge with crude coal tar shall be used for the production of Naphthalene oil, Creosote oils (light & heavy) and Coal Tar Pitch for industrial purpose.

52.4 Standard Operating Procedure for utilization

This SoP is applicable only for utilization of hazardous wastes i.e. Tarry Residue and Coal Tar Sludge for production of Naphthalene oil, Creosote oils (light & heavy) and Coal Tar Pitch.

1) Tarry residue or coal tar sludge shall be procured only in tankers mounted over vehicles fitted with requisite safeguards ensuring no spillages, as authorised by SPCB/PCC.
2) Tarry residue or coal tar sludge shall be received into storage tank and a transfer pump shall be used to transfer the tarry residue. All the tanks and transfer pump shall be under covered shed to eliminate any contact with rain water. The storage tanks shall be provided with water seals to all probable leaking points so as to minimise the VOCs emissions.
3) There should be designated space for unloading of tarry residue or coal tar sludge into storage tank.
4) The storage tank shall be preferably placed above the ground with low raise bund wall & cemented floor with slope to collect spillages, if any, to collection pit. The collected seepage shall be reused in the process. The vent of storage tank shall be connected through condenser in case of underground storage of tarry residue or coal tar sludge, storage tank may be below the ground provided it has HDPE liner system beneath the tank and leachate collection system below HDPE liner. In the event of leachate detection in the leachate collection system, collective measures shall be taken immediately.
5) During loading and unloading of tarry residue and coal tar sludge from tanker to storage tanks or storage tank to tanker, vent (of both Storage Tank/Tanker) shall be connected to each other so as to minimize VOC emissions.
6) The entire process area shall have cemented floor with the adequate slope to collect spillages, if any, into a collection pit. The spillages from collection pit shall be transferred to ETP or reaction tank, as the cases may be through pump.
7) The Tarry Residue shall be transferred to pre-treatment/vacuum distillation unit by using transfer pumps/pipeline system only.
8) Coal tar sludge shall be transferred to mixing tank through transfer pump/pipeline system only for blending of coal tar sludge and crude coal tar.
9) Once mixing is over the coal tar blend (crude coal tar + coal tar sludge) is transferred to pre-treatment /distillation unit by transfer pumps.
10) There shall be no manual handling of Tarry Residue and coal tar sludge.
11) The tarry residue or coal tar blend shall be heated in pre-treatment tank at the temperature range of 60-120 °C to remove moisture content. The pre-treatment tank shall be connected to condenser through vent of minimum height of 30 meters or as prescribed by the concerned SPCB/PCC.
12) The vent of condenser shall be passed through VOC absorption media like activated carbon.

13) The de-watered coal tar from pre-treatment tank shall be transferred to vacuum distillation unit to produce Naphtalene Oil & Light Creosote Oil (at temperature range of 180-270 °C), Heavy Creosote Oil & Anthracene Oil (at temperature range of 270-320 °C) and Coal Tar Pitch (at temperature range of 320-340 °C)

14) The above products from the product condenser shall be collected in the separate covered product receiving tanks safety valves provision. The product receiving tank shall be connected with common suction system (having vacuum trap pot and water circulating system for creating vacuum in the suction line and scrubbing of vapours) and vent with VOC absorbing media like activated carbon.

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

16) Treatment and disposal of wastewater: Sources of waste water generation are – condensate water generated during distillation shall be treated Physico-Chemically in an ETP of adequate capacity and treated effluent shall be evaporated in single or Multi Effect Evaporator (MEE) so as to meet zero discharge. The waste water generated from floor washing shall be sent to ETP for treatment. Alternate to ETP and single or multi effect evaporator, the condensate water may also be sent to authorized common hazardous waste incinerator for disposal.

17) The waste generated as bottom residue during the distillation process, residue of single or Multi Effect Evaporator/ETP residue, as applicable, shall be 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. Such storage area shall be covered with proper ventilation.

18) 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) such as chemical goggles, full-face shield or a full-face respirator, impervious gloves of chemically resistant material (rubber or neoprene), safety shoes, etc.

19) It shall be ensured that the Tarry Residue and coal tar sludge is procured from the industries who have valid authorization for generation/storage of the same from the concerned State Pollution Control Board as required under HOWM Rules, 2016.

20) Transportation of hazardous wastes such as coal tar 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.

21) Prior to utilization of tarry residue or coal tar sludge, the unit shall obtain authorization for generation, storage and utilization of Tarry Residue and coal tar sludge from the concerned SPCB/PCC under HOWM Rules, 2016.

22) 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.

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

24) 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.

52.5 Record/Returns Filing

1) The unit shall maintain a passbook issued by concern SPCB and maintain details of each procurement of Tarry Residue and coal tar 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 tarry residue and coal tar sludge, quantity, date wise utilization of tarry residue and coal tar sludge, quantity of products 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 the HOWM Rules, 2016.

52.6 Standards

1) Source Emissions monitoring from the stack connected to distillation unit shall comply with the following emission standards or as prescribed by the concerned SPCB/PCC, whichever is stringent;

PM_{10}	:	50 mg/Nm3
SO_2	:	200 mg/ Nm^3
NO_X	:	400 mg/ Nm^3
Ammonia	:	75 mg/ Nm^3
TOC	:	20 mg/ Nm^3

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

PM_{10}	:	5 mg/m^3 TWA* (PEL)
Naphthalene	:	50 mg/m^3 TWA* (PEL)
Coal tar pitch volatile (benzene soluble fraction), anthracene, BaP, phenanthrene, acridine, chrysene, pyrene	:	0.2 mg/m^3 TWA* (PEL)
Ammonia	:	35 mg/m^3 TWA* (PEL)
Carbon Monoxide	:	55 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) Emission from vent attached with condenser and product receiving tank shall comply with standard of Total Organic Carbon (TOC) i.e. 20 mg/ Nm^3.

4) 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 ISO17025 accredited or EPA approved laboratories and the results shall be submitted to the concerned SPCB/PCC on a quarterly basis.

52.7 Siting of Industry

Facilities for utilization of tarry residue or coal tar 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. Further, such facilities shall be located at least 500 meters away from the residential area.

52.8 Size of plant & Efficiency of Utilization

(i) 13.05 MT of Coal Tar Pitch, 7.48 MT of Creosote Oil and 0.225 MT of Crude Naphthalene may produce from 20.935 MT & 1.130 MT of Crude Coal Tar & Coal Tar Sludge respectively in the ratio of 95:5 percentages.

(ii) 15 MT of Tarry residue may produce 13.05 MT of Coal Tar Pitch and & 1.5 MT of Creosote Oil.

Therefore, requisite facilities of adequate size of storage shed and other plant & machineries as given in para 52.10 below shall be installed accordingly

52.9 On-line detectors / Alarms / Analysers

Online emission monitoring system for TOC emission should be installed in vent and online emission data be connected to server of the concerned SPCB/PCC within the time line stipulated by the concerned SPCB/PCC. Smoke detector and fire alarm system shall be installed at Tarry Residue and coal tar sludge storage and handling area.

52.10 Checklist of Minimal Requisite Facilities

S. No	Particulars
1	MS tanks for receiving and storage of tarry residue and coal tar sludge
2	Connection of vent to the tanker with tarry residue and coal tar sludge storage tanks during loading and unloading.
3	Cover over tarry residue and coal tar sludge storage tank, transfer pump, etc. so as to eliminate any contact with rain water.
4	Firefighting system (i.e. fire extinguisher and water hydrant) in storage area, pre-treatment tank, vacuum distillation unit and product receiving tank.
5	Smoke detector and fire alarm system.
6	Heating system with automatic cut-off system for heating of coal tar blend.
7	Vacuum distillation unit attached with product condenser and product receiving tanks.
8	Vent with VOC absorption media like activated carbon of height as prescribed by SPCB/PCC.
9	Height of stack be at least 30 meters or as prescribed by SPCB/PCC.
10	Common suction system with vacuum trap pot and water circulating arrangement.
11	Cooling tower.
12	ETP for proper treatment for CN, Phenol, O&G, COD, TKN and TDS and single or multiple effect evaporator/ Zero Liquid Discharge (ZLD) to be maintained.
13	Dedicated covered shed for storage of hazardous wastes generated (leaks/spills/debris containing tarry wastes, used oils ETP sludge/residue, spent carbon, condensate water, etc.) and its disposal as per authorization condition.

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