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 Process/Distillation Residue [generated during manufacturing of Diphenol (Hydroquinone & Catechol)] as supplementary fuel along with coal in boiler

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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 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 hazardous waste i.e. Process/distillation residue for utilization.
   f. Monitor closely the quantity of process/distillation residue being generated during manufacturing of diphenol and the quantity being utilized as supplementary fuel in fluidized bed boilers 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 at least 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 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) 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 any 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 Process/distillation residue shall maintain daily records in National Hazardous Waste Tracking System (NHWTS).

104.0 Utilization of Process/distillation residue:

Type of HW	Source of generation	Recovery/Product
Process/Distillation Residue (Category 20.3 of Schedule I of HOWM Rules, 2016)	Generated during distillation process in manufacturing of Diphenol (Hydroquinone & Catechol)	To be utilized as supplementary fuel in fluidized bed boiler along with coal of capacity >100TPH steam generation.

104.1 Source of Waste

The process/distillation residue is generated during distillation process in manufacturing of Diphenol (Hydroquinone and Catechol) is categorized as hazardous waste at S. No. 20.3 of Schedule-I of HOWM Rules, 2016, that can be utilized as energy resource in Boiler subject to compliance to these SOPs.

Table: 1- Typical characteristics of process/distillation residue is given below:

Parameters	Results	Unit
Moisture Content	2.07	%
VOC at 450°C	11.97	%
Ash Content	6.55	%
Loss of Ignition	93.1	%
TOC	48.46	%
Hydrogen	4.9	%
Oxygen	45.64	%
Calorific Value	5952	kcal/kg
Phenolic Compound	134	mg/kg
Ammonical Nitrogen	140	mg/kg
Nitrite	6	mg/kg
Nitrate	48	mg/kg
Total Chromium	15	mg/kg
Iron	49	mg/kg

Note: SPCBs/PCCs to check the characteristics of process/ distillation residue prior to issuance of authorization, any significant deviation with respect to typical values mentioned in the table above may be examined with respect to the source or may be referred to CPCB.

104.2 Utilization Process

Mixing & Feeding mechanism of process/distillation residue & Coal:

The process/distillation residue is transferred to coal storage yard where it will be mixed with coal, which undergoes crushing, grinding and sieving in closed system with no fugitive emissions and sent through closed conveyer duct/pipe system connected to storage silos before feeding to the boiler.

Coal (95%) + Process/ Distillation residue (5%) → Hopper → Conveyor belt → Crusher → Screen (8-10 mm) → Bunker/Silo → Boiler

The process/distillation residue is mixed with coal in pulverisation unit and the mixture (in the ratio of 5:95) is fed through mechanised system into fluidized bed boiler (for energy recovery). The flue gases pass through heat economizer is passed through Electro Static Precipitator

(ESP)/ bag filters, in addition to alkali scrubbers before dispersion into atmosphere through stack.

Process residue can also be pulverized separately in a closed unit and then mixed with pulverized coal in a mixing unit at 5:95 ratio with fugitive emissions control system such as bag filters and then stored in silo/bunker before feeding in boiler.

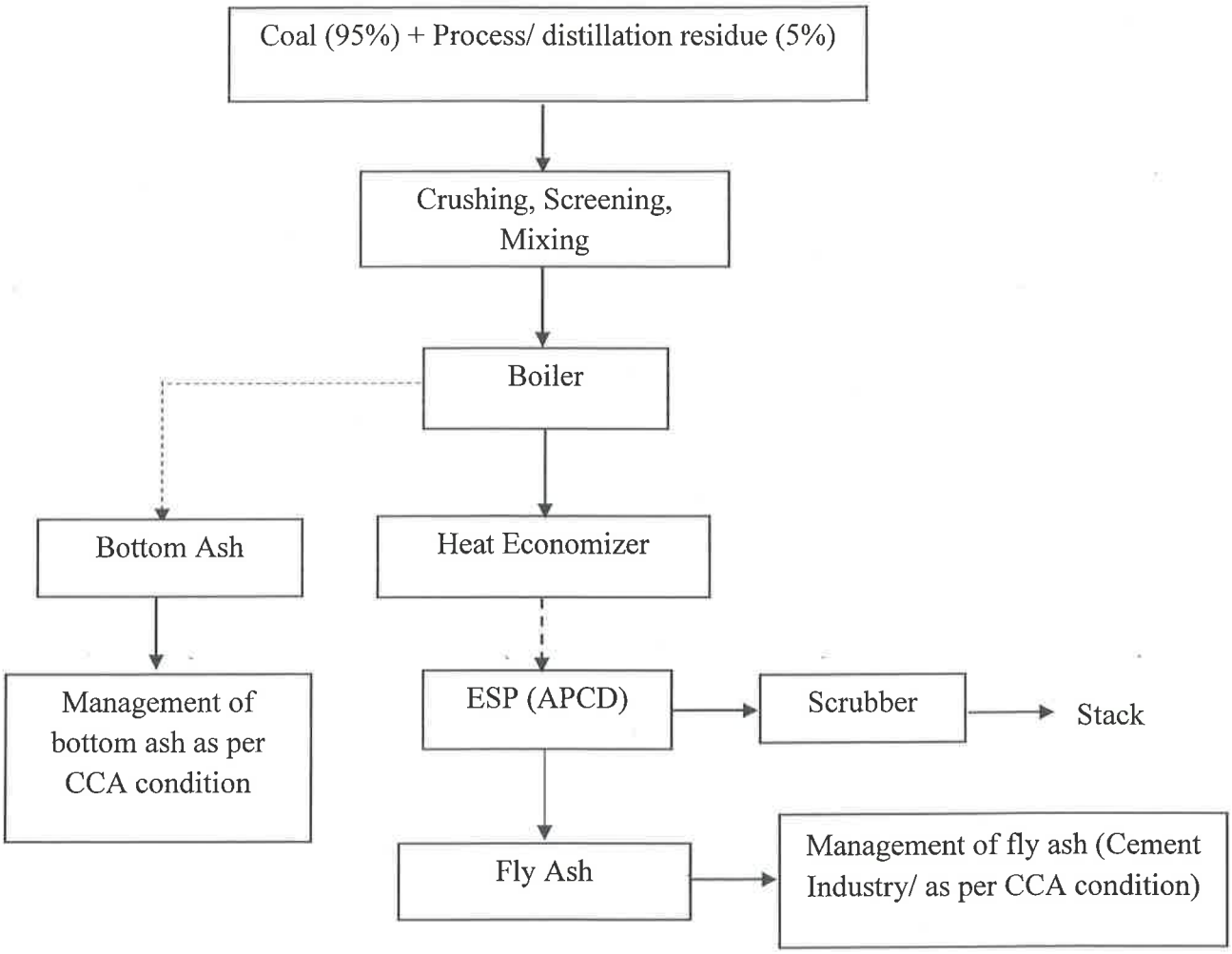

Figure: 1-*Process flow diagram for utilization of process/ distillation residue along with coal in boiler.*

104.3 Standard Operating Procedure for utilization

This SoP is applicable only for utilization of process/distillation residue [generated during manufacturing of Diphenol (Hydroquinone & Catechol)] along with coal for energy recovery in boiler.

1) The Process/distillation residue shall be procured only in SPCB/PCC authorized vehicles fitted with requisite safeguards. Closed cart or mechanised systems to be used in case of captive utilization.

2) The Process/distillation residue shall be stored 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.

3) The Transfer of Process/distillation residue from storage shed shall be carried out through mechanical conveyer to hopper/mixing unit where Process/distillation residue shall be grinded, crushed and mixed with coal and then stored in silo/bunker before feeding in boiler. The mixing system shall have dust extraction system connected with pulse jet bag filter, to control fugitive emissions.

4) Uniform mixing of coal (95%) and grinded process/distillation residue (5%) shall be achieved by appropriate mechanized mixing units. The facility should have pulverization unit for mixing of Process/distillation residue and coal.

5) Utilization of Process/distillation residue shall not exceed 5% of the coal consumed in the fluidized bed combustion boiler.

6) Utilization shall only be permitted in fluidized bed combustion boiler and the temperature of boiler shall be maintained at not less than 850°C for at least 1 second duration.

7) The minimum capacity of boiler to be 100 TPH of steam generation which shall be used in industrial operation including Captive Power generation.

8) 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.

9) 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.

10) It shall be ensured that the Process/distillation residue is procured from the industries, which have valid authorization from the concerned SPCB/PCC as required under HOWM Rules, 2016.

11) Transportation of Process/distillation residue 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.

12) Prior to utilization of Process/distillation residue, the unit shall obtain authorisation for generation, storage and utilization of Process/distillation residue from the concerned SPCB/PCC under HOWM Rules, 2016.

13) The unit shall submit quarterly and annual information on process/distillation residue 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 process/distillation residue for initial one year.

14) The wastes generated such as Bottom ash & fly ash shall be collected and temporarily stored in non-reactive drums/ bags under a dedicated waste storage area and be managed in accordance with the authorization issued by the concerned SPCB/PCC. Such storage area shall be covered with proper ventilation

15) 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.

16) 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.

17) The unit shall provide suitable fire safety arrangements and flame proof electrical fittings and on site emergency plan approved by concerned agency.

18) 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.

104.4 Product Usage / Utilization

The process/distillation residue 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.

104.5 Record/Returns Filing

1) The unit shall maintain a passbook issued by concern SPCB/PCC and maintain details of each procurement of Process/distillation residue 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 procurement of Process/distillation residue, 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 received, generated, utilized, disposed etc. 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, utilized, etc.

104.6 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	As prescribed by the concerned SPCB/PCC
SO_2	
NO_x	
TOC	20 mg/Nm^3
PCDDs	0.1 ng TEQ/Nm^3 (at 11% O_2)

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

PM_{10}	5 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) TOC in fly ash shall be less than 5%. Phenolic compounds in ash shall be < 0.009 mg/Kg. TCLP levels of individual phenolic compounds in ash shall not exceed the limits prescribed in Schedule II of HOWM Rules, 2016.

4) Monitoring of the above-specified parameters (Sl. No. 1 to 3) for source and fugitive 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.

5) 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 (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.

104.7 Siting of Industry

The existing boiler of capacity > 100TPH may utilize Process/Distillation Residue in existing plants at locations where CTE and CTO has already been issued by SPCBs/PCCs. The plant shall preferably be located in a notified industrial area or industrial park/estate/cluster.

104.8 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.

104.9 On-line detectors / Alarms / Analysers

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

104.10 Checklist of Minimal Requisite Facilities

Sl. No.	Particulars
1	Cool, dry well-ventilated covered storage shed(s) for Process/distillation residue storage and process activities within premises.
2	The process area for crushing, blending, grinding, screening operations shall have proper ventilation
3	Closed Conveyor transfer system along with the bag filter installed with crusher for coal, Process/distillation residue.
4	Pulverization units for crushing and appropriate equipment for grinding and mixing connected with fugitive dust control system attached to pulsejet bag filter.
5	The pulverized residue shall be transferred through closed pneumatic ducting system.
6	Dedicated storage area for bottom ash & fly ash.
7	Fluidized bed combustion boilers with minimum capacity of boiler to be 100 TPH of steam generation.
8	Electrostatic Precipitators, Bag Filters (APCD) and Alkali Scrubber.
9	The air pollution control device shall have arrangement of activated carbon injection system prior to bag-filters for control of Dioxin and furan
10	In case of continuous process operations, online emission analysers for PM, SO_2, NO_X and TOC in the stack
11	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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