

**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 Spent Solvent for recovery of solvent**  
(Revised)



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**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**

- (i) 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) should have similar source of generation as specified in SoPs.
  - b. The utilization process should be similar to the process of utilization described in SoPs.
  - c. End-use / product produced from the waste shall be same as specified in SoPs.
  - d. Authorisation shall be granted only after verification of minimum requisite facilities installed and after verification of utilization process as given in SoPs.
  - e. Issuance of passbooks (similar to the passbooks issued for recycling of use oils, waste oil, non-ferrous scraps, etc.) for maintaining records of receipt of hazardous wastes for utilization.
- (ii) After issuance of authorization, SPCB shall verify the utilization process, checklist and SOPs, quarterly during the initial 02 years of operation followed by random checks in subsequent year's atleast once in every year.

In-case of lack of requisite infrastructures with the SPCBs/PCCs, SPCBs/PCCs may engage 3<sup>rd</sup> party institutions and EPA/NABL/ISO17025 accredited laboratories for monitoring and analysis of prescribed parameters of the SoPs for verification purpose. Such labs shall have accreditation (EPA/NABL/ISO17025) for the parameters specified in SoP.
- (iii) SPCB shall provide half yearly up-dated list of units permitted for utilization of hazardous waste to CPCB and also periodically update the same on SPCB website. Such updated list shall be sent for January-June and July-December of every year and reach to CPCB by July and January respectively of every year.
- (iv) 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 or its complete utilisation or arrangement of sharing with any other authorised disposal facility,
- (v) In case of the utilization proposal is not similar with respect to source of generation, utilization process and end-use as outlined in this SoP, the same may be referred to CPCB for clarification / conducting trial utilization studies and developing SoPs.
- (vi) The source and work zone standards suggested in the SoPs are based on the E(P)A notified and OSHA standards respectively, however, SPCB/PCC may impose more stringent standards based on the location or process specific conditions.

**1.0 Source of Waste**

Spent Solvent is generated during use of solvent to dissolve or dilute other substances or materials or as chemical intermediates in various industrial processes. These spent solvents are hazardous wastes and are required to be disposed, when not utilized as resource recovery, in authorized disposal facility in accordance with authorization condition stipulated by the concerned SPCB/PCC.



## Standard Operating Procedure for utilization of Spent Solvent for recovery of solvent

This SoP is applicable only for utilization (including captive utilization) of spent solvent to recover solvent as below:

Type of HW	Source of generation	Recovery/Product
Spent Solvent (Hazardous waste categories 20.2; 21.2; 26.4; 28.6 and 29.4 of Schedule I of HOWM Rules, 2016)	Industrial uses of solvents; Production or industrial use of paints, pigments, lacquers, varnishes and inks; Production or industrial use of synthetic dyes, dye-intermediates and pigments; Production/formulation of drugs/pharmaceutical and health care product, and; Production and formulation of pesticides including stock-piles.	Recovered solvent or mixture of solvent containing; Acetone, Toluene, Benzene, Xylene, Cyclohexane, Methyl Iso Butyl Ketone, Methanol, Iso Propyl Alcohol, Methylene Dichloride, Tetra Hydro Furan, Ethyl Acetate, Dimethyl formamide, Butyl acetate, Methyl Acetate, Butanol, Ethanol, Methyl Ethyl Ketone and Iso Propyl Ether

### 1.1 Utilization Process

The recovery of solvent shall involve fractional distillation of spent solvent followed by single or two stages cooling in primary and secondary condenser, depending upon boiling point of the spent solvent.

Water shall be used as cooling medium for condenser for recovery of spent solvents having boiling point of 100°C and above whereas for solvents with low boiling point (i.e. <100°C), the unit shall provide secondary condenser with chilled water/brine as cooling medium.

### 1.2 Product Usage / Utilization

The solvent recovered from Spent Solvent generated from pesticides industry shall preferably be sent to the generator itself or other pesticides manufacturing units. However, such recovered solvent shall not be used in the process of production of pharma, food, and cattle feed.

The packaging of product (i.e. recovered solvent) shall be labelled as "This product has been recovered from Spent Solvent generated from Pesticides/Dye and Dye intermediated industries/Drugs/etc. (as the case may be) manufacturing process".

### 1.3 Standard Operating Procedure for utilization

This SoP is applicable only for the utilization of Spent Solvent for recovery of solvent.

- (1) The Spent Solvents containing Toluene, Xylene, Cyclohexane, Acetone, Methyl isobutyl ketone, Methanol, Isopropyl alcohol, Methylene Dichloride, Tetra Hydro Furan, Ethyl Acetate, Iso Propyl Ether, Dimethyl formamide, Butyl acetate, Methyl Acetate, Butanol, Benzene, Ethanol and Methyl Ethyl Ketone shall be procured only in tankers/drums.
- (2) The Spent Solvents shall be transferred from tankers/drums to the raw material storage tank and to distillation column by solvent transfer pump.

- (3) Transportation of Spent solvents shall be carried out by sender or receiver (utilizer) only after obtaining authorisation from the concerned SPCB under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
- (4) It shall be ensured that the aforesaid hazardous waste is procured from the industries who have valid authorization for the same from the concerned State Pollution Control Board as required under Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.
- (5) During loading and unloading of Spent Solvents/Recovered Solvent from Tanker to Storage Tank or Storage Tank to Tanker, vent (of both Storage Tank/Tanker) shall be connected to each other so as to minimize VOC emissions.
- (6) Vent of all storage tanks (i.e. Spent Solvent and Recovered Solvent) shall be connected through condenser.
- (7) All the Vehicles entering the utilization premises shall be fitted with the spark arrestor.
- (8) The vent of the condenser shall be at least 06 meters above the roof top or at height prescribed by SPCB/PCC, whichever is higher.
- (9) The vent of condenser shall be passed through VOC absorption media like activated carbon and shall comply with the prescribed standards.
- (10) 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 such as hard hats, goggles, face shield, steel toed shoes, gloves, aprons, respirators etc.
- (11) The unit shall provide laboratory facility for analysis of solvent.
- (12) The unit shall provide suitable fire safety arrangements and spark/flare proof electrical installation/ fittings.
- (13) The unit shall obtain license from Petroleum and Explosive Safety Organization of Govt. of India.
- (14) The Spent solvent generated from Pesticides industry shall not be mixed with any other spent solvent and be distilled separately in separate batch.

The solvent recovered from Spent Solvent generated from pesticides industries shall preferably be sent to the generator itself or other pesticides manufacturing units. However, such recovered solvent shall not be used in the process of production of pharma, food, and cattle feed.

- (15) The packaging of product i.e. recovered solvent shall be labelled as "This product has been recovered from Spent Solvent generated from Pesticides/Dye and Dye intermediate industries/Drugs/etc. (as the case may be) manufacturing process".
- (16) Residue generated from the distillation unit shall be packaged and temporarily





stored in a dedicated hazardous waste storage area within the unit. The same shall be disposed in Common Hazardous Waste Treatment, Storage and Disposal Facility (CHWTSDF) or sent to cement kilns for co processing/utilization at facility, as authorised by the concerned SPCB/PCC.

- (17) The unit shall ensure that all the discarded/used drums/barrels are either sent back to the unit from where the Spent Solvent is procured or to the facility who has authorisation for utilization of used drums/barrels or to CHWTSDF for disposal, as authorized by the SPCB/PCC.
- (18) The condensate water from distillation and effluent generated from cooling tower shall be managed as per the conditions stipulated by the concerned SPCB/PCC under the Water (Prevention and Control of Pollution) Act, 1974.
- (19) Transportation of the residues generated during the utilisation process shall be carried out by sender or receiver (TSDF operator) as per the authorization issued by the concerned SPCB in accordance with provisions under the Hazardous and Other Wastes (Management & Transboundary Movement) Rules, 2016.
- (20) In case of environmental damages arising due to improper handling of hazardous wastes including accidental spillage during generation, storage, processing, transportation and disposal, the unit 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.
- (21) During the process of utilization and handling of hazardous waste, the unit shall comply with the requirements in accordance with the Public Liability Insurance Act, 1991 as amended, wherever applicable.

#### 1.4 Record>Returns Filing

- (1) The unit shall submit quarterly and annual information on the said hazardous wastes (i.e. spent Solvent) consumed, its source, products generated and resources conserved (specifying the details like type and quantity of resources conserved) to the concerned SPCB/PCC.
- (2) The unit shall maintain a passbook issued by concerned SPCB wherein the following details of each procurement of Spent Solvent shall be entered:
  - Address of the sender
  - Date of dispatch
  - Quantity procured with percentage content of moisture and solvent in the same
  - Seal and signature of the sender
  - Date of receipt in the premises
- (3) A log book shall be maintained with information on source and date of procurement of Spent Solvent, quantity, percentage content of solvent and

moisture in the same, date wise utilization of the same, hazardous waste generation and its disposal, etc.

- (4) 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.

### 1.5 Standards

- (1) During recovery of solvent from spent solvents, the unit shall comply with the following work zone standards:

S. No.	Substance	CAS No.	TWA*
			PPM
1	Toluene	108-88-3	100
2	Xylenes (o-,m ,p- isomers) m-Xylene alpha,	1330-20-7	100
3	Cyclohexane	110-82-7	300
4	Acetone	67-64-1	1000
5	Methyl isobutyl ketone	108-10-1	100
6	Methanol	67-56-1	200
7	Isopropyl alcohol	67-63-0	400
8	Methylene Dichloride	75-09-2	25
9	Tetra Hydro Furan	109-99-9	200
10	Ethyl Acetate	141-78-6	400
11	Iso Propyl Ether	108-20-3	500
12	Dimethyl formamide	68-12-2	10
13	Butyl acetate	123-86-4	150
14	Methyl Acetate	79-20-9	200
15	Butanol	71-36-3	100
16	Benzene	71-43-2	1
17	Ethanol	64-17-5	1000
18	Methyl Ethyl Ketone	78-93-3	200

\*time-weighted average (TWA), the PELs are 8-hour TWAs.

- (2) The vent of condenser shall be passed through VOC absorption media like activated carbon and shall comply with Process vent emission Standard of Total Organic Carbon (TOC)  $\leq$  20 ppm.
- (3) Monitoring of the specified parameters for source emission shall be carried out quarterly for the first year followed by atleast 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 accredited or EPA approved laboratories and results shall be submitted to the concerned SPCB/PCC quarterly.



**1.6 Siting of Industry**

Facilities for utilization of Spent Solvent 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.

**1.7 Size of Plant & Efficiency of utilisation**

Output as recovered solvent depends upon content of solvent, moisture and impurities present in the spent solvent. It is expected that full quantity of solvent (present in the spent solvent) be recovered with negligible loss. Therefore, requisite facilities of adequate size of storage shed and other plant & machineries as given in para 1.9 below shall be installed accordingly.

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

Regular VOC monitoring with portable VOC meter at primary and secondary vent condensers and online fixed VOC detector connected to data logger to be provided by the concerned unit. In case of continuous process online emission data be connected to server of the concerned SPCB/PCC.

**1.9 Checklist of Minimal Requisite Facilities**

S. No.	Particulars
1	Tankers/HDPE drums for receiving spent solvents
2	Connection of vent of the tanker with Spent solvent storage tanks during loading and unloading.
3	Solvent transfer pump (s) for transferring Spent Solvent from tanker/drums to storage tank.
4	Solvent transfer pump (s) for transferring Spent Solvent from storage tank and to distillation column.
5	Connection of vent of the tanker with Recovered solvent storage tanks during unloading
6	Vent of all the storage tanks (i.e. Spent solvent & recovered solvent) be connected to condenser.
7	Vehicles be fitted with the spark arrestor
8	Thermic fluid heater/ electric heating system
9	Distillation column
10	Water as cooling medium for condenser for recovery of Spent solvent with boiling point of 100°C and above
11	Cooling Tower
12	Secondary condenser with chilled water/brine as cooling medium for solvent with low boiling point (i.e. <100 C).
13	VOC absorption media connected to vent of condenser
14	Height of vent of condenser be least 06 meters above the roof top or at height prescribed by SPCB/PCC, whichever is higher
15	Dedicated hazardous waste storage area for res due generated from

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	distillation column
16	fire safety arrangements and spark/flame proof electrical installation/ fitting
17	License from Petroleum and Explosive Safety Organization of Govt. of India
18	Regular VOC monitoring with portable VOC meter at primary and secondary vent condensers and online fixed VOC detector connected to data logger to be provided by the concerned unit. In case of continuous process online emission data be connected to server of the concerned SPCB/PCC.

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