

Standard Operating Procedure (SOP) for Petrol Depots

Background

Hon'ble National Green Tribunal, Eastern Zone Bench, Kolkata in the matter of Original Application No.154/2022/EZ (I.A. No.236/2022/EZ) vide order dated 17.04.2023 directed Central Pollution Control Board to prepare Standard Operating Procedure (SOP) for Petrol Depots within three months.

Accordingly, Central Pollution Control Board prepared Standard Operating Procedure (SOP) for Petrol Depots.

This SOP shall be applicable for Petrol Depots (other than Petrol Pumps / Retail Outlets) having facilities for storing, handling, distribution, transportation, loading or unloading of petrol and that are liable to take approval / license from the Chief Controller of Explosives for storage of petrol.

Standard Operating Procedure (SOP) for Petrol Depots is as follows:

A. General Compliance:

1. Petrol depots shall have to obtain Consent to Establishment prior to establishment and Consent to Operate prior to starting operations from the concerned State Pollution Control Board / Pollution Control Committee (SPCB / PCC).
2. Prior to commissioning, petrol depots shall take out one or more insurance policies in accordance with the stipulations of The Public Liability Insurance Act, 1991 as amended.
3. Prior to commissioning, petrol depots shall provide a baseline monitoring data of ambient air, soil and groundwater quality (of the locations situated between the boundary of the planned storage and 50 m outwards) covering relevant pollutant parameters; from any laboratory recognized under Environment (Protection) Act 1986 / laboratory accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) to concerned SPCB / PCC. The existing petrol depots may obtain baseline data from any earliest date within a year subsequent to issuance of this SOP.
4. Any major leakage/spillage occurring inside the petrol depot or around the petrol depot during transportation / supply of petrol / any other activity related

to the concerned petrol depot shall be reported by petrol depot to the concerned SPCB/ PCC, Petroleum and Explosive Safety Organization (PESO), Oil Industry Safety Directorate (OISD), Petroleum and Natural Gas Regulatory Board (PNGRB) and District Administration under intimation to CPCB within 24 hours of occurrence

5. Petrol Depots shall conduct groundwater monitoring to detect any contamination. Ground water sampling and monitoring for detection of any contamination shall be done through existing piezometer / bore well located within premises of petrol depot or within 50 m from petrol depot (in case no piezometer /bore well exists in petrol depot) from at least three different directions with reference to the expected point of groundwater contamination or in the upstream and downstream direction to the flow of groundwater with reference to the expected point of groundwater contamination.
6. Groundwater monitoring wells should be monitored within 30 days of commissioning of the petrol depots. Thereafter, groundwater sampling and analysis should be undertaken annually. Groundwater should compulsorily be sampled and analysed under information to the concerned SPCB / PCC when any leakage occurs or suspected to have occurred.

The parameters for which groundwater samples shall be analysed and their respective screening values are as follows:

S. No.	Parameter	Screening Values
1.	Total petroleum hydrocarbons (C ₁₀ -C ₄₀)	0.6mg/L
2.	Benzene, Toluene and Xylene	i. Benzene- 0.01mg/L ii. Toluene- 0.7mg/L iii. Xylene- 0.5mg/L
3.	Methyl Tertiary Butyl Ether	13µg/l
4.	Total Polycyclic aromatic hydrocarbons (PAH)	0.0001mg/l

7. Further, soil sample shall be collected from a borehole within the premises of the petrol depot adjacent to the underground storage tank or above ground storage tank. The depth of bore hole should be up to 1m below the bottom of the storage tank level.

The parameters for which soil samples shall be analysed and their respective screening values are as follows:

S. No.	Parameter	Screening Values(mg/kg)
1.	Total petroleum hydrocarbons (TPH)	5000
2.	Benzene	5
3.	Toluene	30
4.	Xylene	50
5.	Methyl Tertiary Butyl Ether	100
6.	Total PAH	40

8. Ground water and soil quality monitoring shall be conducted by petrol depots once a year through Environment (Protection) Act, 1986 approved laboratories / NABL accredited laboratories and the reports shall be submitted to concerned SPCB / PCC.
9. In case of exceedance of screening values for any parameter or; in case of any major deviation from the baseline data or; in case of leakage resulting in soil/groundwater contamination, the Petrol Depot shall immediately inform the concerned SPCB / PCC and shall take immediate action to detect and prevent the leakage; and shall carry out further environmental remediation.
10. The petrol depots shall submit ambient air monitoring report w.r.t. notified ambient hydrocarbon parameters on six monthly basis from any laboratory approved under Environment (Protection) Act, 1986 / laboratory accredited by National Accreditation Board for Testing and Calibration Laboratories (NABL) to concerned SPCB / PCC.
11. Petrol depots shall compulsorily provide adequate Effluent Treatment Plant or Oil Water Separator to treat any effluent generated because of tank cleaning or cleaning of storage area, contamination of storm water, any other effluent generating activity and shall ensure that the treated effluent complies with the prescribed standards.
12. Petrol depots shall take necessary steps to prevent entry of storm water to the storage area. In case storm water gets contaminated, there must be adequate arrangements for collection and treatment of storm water prior to its discharge.
13. Petrol depots shall obtain authorization for managing hazardous and other wastes under Hazardous and Other Wastes (Management and Transboundary

Movement) Rules, 2016 from the concerned SPCB / PCC. Storage, collection, handling and disposal of hazardous and other wastes generated because of tank cleaning, effluent treatment or other activities shall be strictly carried out as per stipulations of the aforementioned authorization.

14. The petrol depots shall install Vapour Recovery Systems w.r.t. pertinent directions issued by CPCB / concerned SPCBs / PCCs / PNGRB regulations for petroleum installations / other statutory bodies, as applicable.

B. Prevention of Leakage:

1. For preventing fugitive emissions and standards for equipment leaks, the petrol storage depots may comply with the relevant stipulations stated in Section C (under subheading Fugitive Emissions and Standards for Equipment Leaks) of the Petroleum Oil Refinery standards notified by the Ministry of Environment and Forests (Now the Ministry of Environment, Forests & Climate Change) vide Notification no. GSR 186 (E) dated 18.03.2008, as applicable (Annexed as Annexure –I) **OR** any other applicable norms / guidelines issued by Ministry of Petroleum and Natural Gas / other statutory bodies.

It is clarified that petrol depots may provide the storage tanks and seals as specified in the aforementioned standards notified by the Ministry of Environment and Forests or any other applicable norms / guidelines issued by Ministry of Petroleum and Natural Gas / other statutory bodies. However, the norms (for vapour removal efficiency, Emission control standards for Road tank truck/Rail Tank wagon loading in respect of VOC reduction and Emission, Standards for Equipment Leaks including Leak Detection and Repair, Frequency of monitoring of leaks etc.) that are more stringent among the aforementioned standards shall be complied by the petrol depots.

2. Petrol depots shall install hydrocarbon detectors along with alarming system at the leakage prone locations to detect any leakage at the earliest as per PNGRB regulations for petroleum installations, as applicable.
3. Petrol depots shall install spill prevention equipment and overflow prevention equipment as per extant and applicable standards and guidelines.
4. The separation between above ground petrol storage tanks shall be as per extant norms / guidelines of Ministry of Petroleum and Natural Gas (MoPNG) / OISD / PNGRB or other statutory bodies.

5. The tanks and pipework of petrol storage tanks should meet the following requirements:
 - i. The material of construction and design of storage tanks and pipelines should be in accordance with the extant and applicable standards.
 - ii. Efficient secondary containment (as detailed in Section C) shall be provided to prevent release of any leakage to the environment.
 - iii. There should be adequate monitoring system to detect any leakage from the tank or pipelines as per norms / guidelines of MoPNG / OISD or other statutory bodies.

6. The petrol depots shall provide adequate tertiary containment to prevent escape of spills due to failure of secondary containment as per Petroleum and Natural Gas Regulatory Board (Technical Standards and Specifications including Safety Standards for Petroleum Installations) Regulations, 2020.

C. Secondary containment:

Secondary containment systems must be designed, constructed, and installed to contain leakage / spillage released from the storage tank and shall have system to detect the failure / breach of the containment system and shall prevent the release of leaked petrol to the environment at any time during the operational life of the storage tank system; and may be checked for leakage regularly. There should be proper arrangements so that any leakage within the secondary containment area may be timely detected and disposed in an environmentally safe and sound manner.

1. Secondary containment for underground tanks:

All the underground petrol storage tanks shall provide secondary containment system to prevent the leakage to escape to the environment by providing enclosure which is impervious for petrol and able to contain and withstand the hydraulic pressure of the leaked petrol.

Secondary containment can be provided by providing double walled tanks or by constructing concreted and impervious enclosure around storage tanks.

Double walled tanks must be capable of:

- i. Contain a leak from any portion of the inner tank within the outer wall;
- ii. Detect the failure / breach of the inner wall.

2. Secondary containment for above ground petrol tanks:

All the above ground petrol storage depots shall provide secondary containment system to prevent the leaked petrol to escape to the environment. The secondary containment may be provided by constructing a dyked enclosure. The dyked area should prevent the interference of storm water or groundwater intrusion, should surround the tank completely and should be impervious and capable of preventing migration of leaked petrol.

Alternatively, any other secondary containment system for above ground / underground storage tanks as per norms / guidelines of MoPNG / OISD / Petroleum and Natural Gas Regulatory Board (PNGRB) or other statutory authorities / internationally best practiced containment systems that are adequate to contain the leakages may be provided.

The secondary containment system shall be routinely inspected for its structural stability and adequacy for providing containment.

D. Monitoring

1. Interstitial monitoring:

Interstitial monitoring system having hydrocarbon detectors and alarming system / other monitoring devices shall be installed between the petrol storage tanks and secondary containment barrier to detect any leakage.

2. Vapour monitoring wells:

In case interstitial monitoring (of underground tanks) is not feasible, vapour monitoring wells may be installed as alternative leak detection system that can be used either continuously or regularly to monitor for hydrocarbon vapours in the soil surrounding the tanks (beyond secondary containment). It should be ensured that the soil / filler material between secondary containment and the vapour monitoring wells has a sufficient liquid / vapour conductivity for passage of petrol vapours.

The vapour monitoring system should not be affected by rainfall or moisture or any contamination which can interfere with monitoring.

3. Other routine leakage detection systems:

All new petrol storage tanks will have automation system (automatic tank gauging) installed which will provide reports on volume balance after every day operation

and records shall be maintained. If feasible, manual gauging shall be done at least once in a month for determining the accuracy of Automatic Tank Gauging; alternatively, the automatic tank gauging system should be calibrated as per equipment manufacturer's guidelines.

The leakage detection system may be provided as per any other applicable norms / guidelines issued by Ministry of Petroleum and Natural Gas / OISD / other statutory bodies.

4. In case of leakage resulting in soil/groundwater contamination:

- i. Concerned Petrol Storage Depot shall report to the concerned State Pollution Control Board / Pollution Control Committee, OISD, PESO, PNGRB and District Administration under intimation to CPCB within 24 hours of occurrence. Operation of such underground storage tank and its ancillary components shall be stopped immediately.
- ii. Petrol shall be removed immediately from petrol storage tank to prevent further release to environment. Measures to prevent explosion due to vapours release due to leakage as recommended by PESO / OISD or other statutory body shall be implemented immediately.
- iii. The petrol storage depot may be held liable for Environmental Compensation (to be imposed by CPCB/ concerned State Pollution Control Board / Pollution Control Committee) and environmental remediation on the basis of proven negligence or violation resulting in environmental damage.
- iv. Operation of petrol storage tank and its ancillary components shall not be resumed till corrective measures to contain and stop leakages are implemented to the satisfaction of PESO and concerned State Pollution Control Board / Pollution Control Committee.

5. Equipment Integrity Test for underground petrol tanks:

The Equipment Integrity Test (EIT) measures the containment integrity of the tanks, fittings and pipes. An EIT should be conducted to evaluate if an underground petrol storage tanks can cause any leakage to the environment and to evaluate if it can provide containment as required

An Equipment Integrity Test should be performed:

- i. Before any new underground petrol storage tank is commissioned
- ii. After any modification or upgradation of underground petrol storage tanks.

- iii. After any repair following the discovery of a leak in the system or replacement of tanks or piping.

The Equipment Integrity Test should be done as per approved Indian or international procedure.

E. For prevention of accidents:

1. Subject to the quantity of petrol that may be stored in a depot and the threshold quantity specified for extremely flammable liquids in The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended, a petrol depot shall ensure compliance of the aforementioned rules including but not limited to:
 - i. General responsibility of the occupier during industrial activity;
 - ii. Notification of Major accident;
 - iii. Approval and Notification of sites;
 - iv. Updating of the site notification following changes in the threshold quantity;
 - v. Safety audit reports and their updating;
 - vi. Quantitative risk assessment /Cumulative risk assessment;
 - vii. Preparation of offsite/ on-site emergency plan and carrying out of mock drills;
 - viii. Information to be given to persons liable to be affected by a major accident etc.
2. A petrol depot shall ensure compliance of all the provisions of The Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 (as amended), as applicable.
3. A petrol depot must obtain no objection certificate from the fire department, as per applicable laws of the concerned State / Union Territory. Approval from the concerned authority as stipulated in Rule 7 of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 (as amended) must invariably be taken by the Petrol Depot.
4. A petrol depot must invariably comply with the extant laws / guidelines concerned with safety or prevention of accidents issued by Ministry of Petroleum and Natural Gas / PESO /OISD/ PNGRB / any other statutory organization, as applicable.

5. In case, a major accident occurs, the petrol depot shall within 48 hours notify the concerned authority as identified in Schedule 5 (of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 as amended) of that accident, and furnish thereafter to the concerned authority a report relating to the accidents in Schedule 6 (of the Manufacture, Storage and Import of Hazardous Chemical Rules, 1989 (as amended)). However, the concerned authorities, local crisis group, District emergency authorities etc. have to be informed by the petrol depot as early as possible.
6. The petrol storage depots must provide proper arrangements to prevent and contain the spread of fire / explosion, as per extant and applicable norms and guidelines issued by Ministry of Petroleum and Natural Gas / PESO /OISD/ PNGRB any other statutory organization.
7. The petrol storage depots must have alarming system to inform and alert the surrounding inhabitants in case of any accident or emergency.
8. The Petrol Depot shall ensure carrying out routine leakage detection and leakage monitoring in case of temporary shutdown.
9. The petrol depots shall adhere to the provisions of the National Disaster Management Act and accordingly, prepare onsite and offsite Emergency Response and Disaster Management Plan(DMP) and shall comply with the Petroleum and Natural Gas Regulatory Board (Codes of Practices for Emergency Response and Disaster Management Plan) Regulations, 2010.
10. The petrol depots must ensure that overall safety measures taken by the depot and other ancillary procedures viz. safety audit, risk analysis, risk management etc. shall cover its own premises as well as the area beyond its premises which is vulnerable to risk in case of any incident. Adequate safeguarding measures must be taken so that there may be no risk to the life and property of inhabitants beyond the premises of depot in case of incident.

F. Location and Siting of Petrol Depot:

1. The location and siting of petrol depot shall strictly be in accordance with the extant law / guidelines issued by Ministry of Petroleum and Natural Gas / PESO / any other statutory organization as applicable.
2. The petrol depots shall comply with the MoPNG accepted recommendations of the M.B. Lal Committee (which was constituted by MoPNG to probe the incident of fire at Indian Oil Corporation's POL (Petroleum Oil Lubricants) Terminal at Jaipur in 2009) regarding creation of a buffer safety zone of 250 to 300 metres around petroleum installations (including petrol depots).

It is clarified that a buffer zone of 250 to 300 metres shall be provided between the periphery of petrol depot and any area of human inhabitation around it

including residential, industrial and commercial areas and other sites of human gathering including educational institutions, healthcare facilities, historical structures, places of worship etc. in accordance with the recommendations of MB Lal Committee. The quantitative/cumulative risk of all tanks of petrol depots should be zero at petrol depot boundary wall by providing adequate mitigation / remedial measures.

3. The SPCBs / PCCs while granting Consent to Establish / Operate to new petrol depots shall give due consideration to the pollution causing potential and ecological sensitivity of the pertinent region as well as extant local government laws regarding setting of such major accident hazard industries and extant law / guidelines issued by MoPNG / PESO / any other statutory organization as applicable.
4. New / upcoming petrol depots shall be located at least 100 m away from the surface water bodies including lakes, ponds, streams, rivers, wetlands, canals and creeks. In case of streams and rivers, the distance shall be considered from the flood way. In case, flood way is not defined, the distance shall be considered from firm banks / edges of the river.

G. Decommissioning of tanks:

1. In case any above ground or underground petrol storage tank has to be dismantled, the following must be ensured:
 - i. Removal of all petrol and its disposal in an environmentally sound manner.
 - ii. Removal of any residual flammable vapour and its safe disposal.
 - iii. Removal of any hazardous waste like tank sludge in an environmentally sound manner and its disposal as per extant hazardous waste management rules.
2. The petrol depot before dismantling of tanks shall take permission from the concerned statutory authority and concerned SPCB / PCC.
3. The petrol depot at the time of permanent decommissioning must ensure that the site is investigated for any potential environmental contamination from an expert institution and submit the report to the concerned SPCB / PCC.

Annexure -1

Section C (under subheading Fugitive Emissions and Standards for Equipment Leaks) of the Petroleum Oil Refinery standards notified by Ministry of Environment and Forests vide Notification no. GSR 186 (E) dated 18.03.2008

Fugitive Emission

Storage of Volatile Liquids: General Petroleum Products

1. Storage tanks with capacity between 4 to 75 m³ and total vapour Pressure (TVP) of more than 10 kpa should have Fixed Roof Tank (FRT) with pressure valve vent.
2. Storage tank with the capacity between 75 to 500 m³ and total vapour Pressure (TVP) of 10 to 76 kpa should have Internal Floating Root Tank (IFRT) or External Floating Root Tank (EFRT) or Fixed Roof Tank with vapour control or vapour balancing system.
3. Storage tanks with the capacity of more than 500 m³ and total vapour Pressure (TVP) of 10 to 76 kpa should have Internal Floating Roof Tank or External Floating Roof Tank or Fixed Roof Tank with vapour control system.
4. The tanks with the capacity of more than 75m³ and total vapour Pressure (TVP) of more than 76 kpa should have Fixed Root Tank with vapour control system.
5. Requirement for seals in Floating Roof Tanks:
 - i.
 - a. IFRT and EFRT shall be provided with double seals with minimum vapour recovery of 96%.
 - b. Primary seal shall be liquid or shoe mounted for EFRT and vapour mounted for IFRT. Maximum seal gap width will be 4 cm and maximum gap area will be 200 cm²/m of tank diameter.
 - c. Secondary seal shall be rim mounted. Maximum seal gap width will be 1.3 cm and maximum gap area will be 20 cm²/m of tank diameter.
 - d. Material of seal and construction shall ensure high performance and durability.
 - ii. Fixed Roof Tanks shall have vapour control efficiency of 95% and vapour balancing efficiency of 90%.
 - iii. Inspection and maintenance of storage tanks shall be carried out under strict control. For the inspection, API RP 575 may be adopted. In-service inspection with regard seal gap should be carried out once in every six months and repair

to be implemented in short time. In future, possibility of on-stream repair of both seals shall be examined.

Storage of Volatile Liquids: Benzene Storage

1. FRT with vapour to incineration with 99.9% of removal efficiency for volatile organic compounds (VOC) shall be provided.
2. IFRT/EFRT with double seals, emission-reducing roof fitting and fitted with fixed roof with vapour removal efficiency of at least 99% shall be provided.

Solvents for Lube-Base Oil production (Furfural, NMP, MEK, Toluene and MIBK)

IFRT with double seals and inert gas blanketing with vapour removal efficiency of at least 97% shall be provided.

Emission control for Road tank truck/Rail Tank wagon loading		
Loading of Volatile Products	Gasoline and Naphtha :	
	i. VOC reduction, %	i. 99.5
	ii. Emission, gm/ m ³	ii. 5
	Benzene :	
i. VOC reduction, %	i. 99.99	
ii. Emission, mg/ m ³	ii. 20	
Toluene/Xylene:		
i. VOC reduction, %	i. 99.98	
ii. Emission, mg/ m ³	ii. 150	
Note :		
i.	It shall be applicable for Gasoline, Naphtha, Benzene, Toluene and Xylene loading.	
ii.	Road tank Truck shall have Bottom loading and Rail tank wagon shall have Top submerged loading.	
iii.	Annual leak testing for vapour collection shall be done.	

Standards for Equipment Leaks

1. Approach: Approach for controlling fugitive emissions from equipment leaks shall have proper selection, installation and maintenance of non-leaking or leak tight equipment. Following initial testing after commissioning, the monitoring for leak detection is to be carried out as a permanent on-going Leak Detection and Repair (LDAR) programme. Finally, detected leaks are to be repaired within allowable time frame.
2. Components to be Covered: Components that shall be covered under LDAR programme include (i) Block Valves; (ii) Control Valves; (iii) Pump seals; (iv) Compressor seals; (v) Pressure relief valves; (vi) Flanges - Heat Exchangers; (vii) Flanges - Piping; (viii) Connectors - Piping; (ix) Open ended lines; and (x) Sampling connections. Equipment and line sizes more than 1.875 cm or ¾ inch are to be covered.
3. Applicability: LDAR programme would be applicable to components (given at 2 above) for following products/compounds: (i) hydrocarbon gases; (ii) Light liquid with vapour pressure @ 20 °C > 1.0 kPa; and (iii) Heavy liquid with vapour pressure @ 20 °C between 0.3 to 1.0 kPa.
4. While LDAR will not be applicable for heavy liquids with vapour pressure < 0.3 kPa, it will be desirable to check for liquid dripping as indication of leak.
5. Definition of Leak: A leak is defined as the detection of VOC concentration more than the values (in ppm) specified below at the emission source using a hydrocarbon analyser according to measurement protocol (US EPA-453/R-95-017, 1995 Protocol for equipment leak emission estimates may be referred to:

Component	General Hydrocarbon (ppm)		Benzene (ppm)	
	Till 31 st Dec. 2008	w.e.f. January 01, 2009	Till 31 st Dec., 2008	w.e.f. January 01, 2009
Pump/Compressor	10000	5000	3000	2000
Valves/Flanges	10000	3000	2000	1000
Other Components	10000	3000	2000	1000

6. In addition, any component observed to be leaking by sight, sound or smell, regardless of concentration (liquid dripping, visible vapour leak) or presence of bubbles using soap solution should be considered as leak.

7. Monitoring Requirements and Repair Schedule: Following frequency of monitoring of leaks and schedule for repair of leaks shall be followed:

Component	Frequency of monitoring	Repair schedule
	Quarterly (semi-annual after two consecutive periods with < 2% leaks and annual after 5 periods with < 2% leaks)	Repair will be started within 5 working days and shall be completed within 15 working days after detection of leak for general hydrocarbons. In case of benzene, the leak shall be attended immediately for repair.
Pump seals	Quarterly	
Compressor seals	Quarterly	
Pressure relief devices	Quarterly	
Pressure relief devices (after venting)	Within 24 hours	
Heat Exchangers	Quarterly	
Process drains	Annually	
Components that are difficult to monitor	Annually	
Pump seals with visible liquid dripping	Immediately	Immediately
Any component with visible leaks	Immediately	Immediately
Any component after repair/replacement	Within five days	-

8. The percentage leaking components should not be more than 2% for any group of components, monitored excluding pumps/compressor. In case of pumps/compressors, it should be less than 10% of the total number of pumps/compressors or three pumps and compressor, whichever is greater.
9. Emission Inventory: Refinery shall prepare an inventory of equipment components in the plant. After the instrumental measurement of leaks, emission from the components will be calculated using stratified emission factors (USEPA) or any other superior factors. The total fugitive emission will be established.

10. Monitoring following types of monitoring methods may be judiciously employed for detection of leaks: (i) instrumental method of measurement of leaks; (ii) Audio, visual and olfactory (AVO) leak detection; and (iii) Soap bubble method.
11. Data on time of measurement and concentration value for leak detection; time of repair of leak; and time of measurement & concentration value after repair of leak should be documented for all the components.
12. Pressure relief and blow down systems should discharge to a vapour collection and recovery system or to flare.
13. Open-ended lines should be closed by a blind flange or plugged.
14. Totally closed-loop should be used in all routine samples.
15. Low emission packing should be used for valves.
16. High integrity sealing materials should be used for flanges.