

**BEFORE THE NATIONAL GREEN TRIBUNAL,
SOUTHERN ZONAL BENCH, CHENNAI
ORIGINAL APPLICATION NO. 176 OF 2013 (SZ) (EARLIER OA NO. 562 of
2018 (PB))**

IN THE MATTER OF

V.P Krishnamoorthy

.....Applicant

Versus

Union of India & Ors

.....Respondents

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H.D. Varalaxmi
Regional Director
Central Pollution Control Board
Regional Directorate, Chennai - 60058

Place: Chennai
Dated: 26.08.2021

Compliance Status Report of CPCB and TNPCB in the matter of O. A. No 176 of 2013 (SZ) (Earlier OA No 562 of 2018 (PB)), V. P. Krishnamurthy Vs Union of India & Ors, as per order dated May 27, 2021.

Background:

The Hon'ble National Green Tribunal, Southern Bench, Chennai, in the matter of O. A. No. 176 of 2013 (SZ) (Earlier O. A. No. 562 of 2018); V. P. Krishnamoorthy Vs. Union of India & Ors, passed an order dated 27.05.2021 that:

“8. It is seen from the reply statement that they have given a detailed reason as to why they have to such conclusion in their report regarding the compliance report showing some deficiencies in the SVE system and directing the M/s BPCL to modify the same. Being an expert body on this aspect, we accept the reply submitted by the Central Pollution Control Board in this regards and direct the M/s BPCL to carry out the directions issued by the Central Pollution Control Board as requested for in this reply statement namely, direct the M/s BPCL to carry out detailed site investigation and risk investigation study to evolve Site Specific Target Levels (SSTLs) for remediation of oil contaminated site at Tondiarpet, Chennai and direct the M/s BPCL to augment SVE system by connecting as many well as possible and by operating both SVE system simultaneously to optimal extraction rate.

9. So, M/s BPCL is directed to carry out these directions issued by the Central Pollution Control Board as part of remediation process.

10. The Learned Counsel appearing for the M/s BPCL submitted that they have already complied with the directions as well. If that be the case, the Central Pollution Control Board is directed to inspect these areas with the Tamil Nadu Pollution Control Board and ascertain as to whether the directions issued by them have been complied with or not. If it is not complied with, then they are directed to issue further necessary direction in this regard and submit a detailed report to this Tribunal before the next hearing date.

11. The Tamil Nadu Pollution control Board is also directed to carry out the directions issued by the central Pollution Control Board in their status report which has been mentioned above.

15. The Central Pollution Control Board as well as the Tamil Nadu Pollution Control Board and the M/s BPCL are directed to file their further status and compliance report including the steps taken regarding the health study that is

directed to be done by the ICMR and submit the reports to this Tribunal on or before 27.08.2021 by e-filing in the form Searchable PDF/OCR supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules”.

A copy of the said order is annexed at **Annexure-I**.

1. Status of Compliance by BPCL w.r.t CPCB directions:

A. *To carry out detailed site investigation and risk assessment study to evolve Site Specific Target Level (SSTLs) for remediation of Oil contaminated site at Tondiarpet, Chennai;*

M/s BPCL submitted the Detailed Site Assessment Report (Post CMRL Excavation) on 06.08.2021, the summary of the assessments are as below;

i. Three soil borings of depth 70 feet, & dia of 8 inch (one near to the Oil pipe where leakage occurred (hot spot) , second one in peripheral of south side, third one in peripheral of North-East direction) were installed at the strategic locations adjacent to existing monitoring wells. The soils samples were taken in 5 feet interval, the samples were analysed, the mass reduction in terms of Total Petroleum Hydro Carbon(TPH) in six year span is depicted in **Annexure – 2**. The analysis reports indicates that;

- Low concentrations of Diesel Range Organics (DRO) were reported in almost all samples, the detected concentrations are in the range of 0.08 mg/kg - 144.61 mg/kg.
- Gasoline Range Organics (GRO) were found below detectable limit (0.01 mg/kg) in most of the samples analysed. Low concentrations were reported at few locations, ranging from 0.02 mg/kg to 4.49 mg/kg.
- Low concentrations of Total Petroleum Hydrocarbon (TPH) were reported in almost all samples, the detected concentrations ranged from 0.08 mg/kg to 153.83 mg/kg.
- Higher concentrations of TPH were reported in soil samples collected between 35-36.5 feet bgs in MW-26A (153.83 mg/kg.) located near SVE-3, 10-11.5 feet bgs in Boring-2 (25.09 mg/kg) located near MW-16AB in Devi polymer property, and in ASB-1 (23.02 mg/kg) & (50.58 mg/kg) located near MW-

1AB in Vardhraj Perumal Koil Street.

- Benzene, Toulene, ethyl benzene, Xylene, PAH and naphthalene were not reported in any of the soil samples.
- The DRO & TPH Concentrations detected in soil samples collected in February 2021 are significantly lower, compared to the concentrations recorded in 2015 siteassessment.

Overall, there is a significant reduction in petroleum hydrocarbon concentrations in soil compared to 2015 data. As per the Ministry of Environment and Forestry (MOEF) document titled Guidance document for assessment and remediation of contaminated sites in India, dated March 2015, screening levels for benzene at 0.5 mg/kg, xylenes at 5 mg/kg, toluene at 3 mg/kg naphthalene at 1 mg/kg and ethylbenzene 5 mg/kg, for a residential neighborhood. For TPH an intervention response level of 5,000 mg/kg. TPH, benzene, xylenes, ethylbenzene, and naphthalene concentration are low and not exceeded the response levels. At a few areas high DRO and TPH concentrations continue to exist (MW-26A, MW-25AB and ASB-1) between 20 - 55 feet bgs that warrant continuation of remediation.

- ii. Seven more new wells (5 shallow wells having depth of 25-35 feet and 2 deep wells of 65-75 feet) were installed to compensate the wells abandoned due to CMRL Excavation, all these wells were monitored once in a month, the reduction of contamination is given at **Annexure -3**.

The analysis reports of Shallow wells;

- DRO was not detected in most of the shallow screened monitoring wells. Low concentrations were reported at few wells ranging from 0.08 mg/L to 0.66 mg/L at MW-25A and MW-26A respectively which are adjacent to abounded wells MW-17A & MW-12A.
- TPH was not detected in most of the shallow screened monitoring wells. Low concentrations were reported at few wells ranging from 0.08 mg/L to 0.66 mg/L at MW-25A and MW-26A respectively.

- Benzene and naphthalene were not reported in any of the groundwater samples collected. only Xylenes reported in MW-2A with concentration of 76.50 mg/L.
- The DRO & TPH Concentrations detected in groundwater samples collected from the existing shallow screened wells and newly installed wells adjacent to the abandoned wells in March 2021 are significantly lower, compared to the DRO & TPH concentrations recorded in 2015 site assessment.
- Polycyclic Aromatic hydrocarbons (PAH) were not detected in any of the ground water samples.

The analysis reports of Deep wells;

- DRO was not detected in most of the shallow screened monitoring wells. Low concentrations were reported at few wells ranging from 0.10 mg/L to 0.35 mg/L at MW-26B and MW-3B, respectively.
- TPH was not detected in most of the shallow screened monitoring wells. Low concentrations were reported at few wells ranging from 0.10 mg/L to 0.35 mg/L at MW-26B and MW-3B, respectively.
- Benzene and naphthalene were not reported in any of the groundwater samples collected. Only Xylenes reported in MW-3B with concentration of 22.97 mg/L.
- The DRO & TPH Concentrations detected in groundwater samples collected from the existing deep screened wells and newly installed wells adjacent to the abandoned wells in March 2021 are significantly lower, compared to the DRO & TPH concentrations recorded in 2015 site assessment.
- Polycyclic Aromatic hydrocarbons (PAH) were not detected in any of the ground water samples.

Overall, the groundwater analytical data indicates that concentration of petroleum hydrocarbons in groundwater within the shallow and deep-screened

monitoring wells has decreased significantly since 2015. As per the Ministry of Environment and Forestry (MOEF) document titled Guidance document for assessment and remediation of contaminated sites in India, dated March 2015, identifies screening levels for, benzene at 0.005 mg/L, xylenes at 0.5 mg/L, toluene at 0.7 mg/L TPH at 0.5 mg/L and ethylbenzene 0.3 mg/L, for drinking water. TPH, benzene, and ethylbenzene concentrations are not exceeding the screening levels.

iii. Quantification of Residual Hydrocarbon mass in contaminated site;

- Based on the analytical data and TPH Iso concentration contour maps of Soil [0’-50’] feet bgs, the lateral extent of petroleum hydrocarbon impact to soil was calculated.
- Approximately, **1053.93 kg** of residual TPH is estimated to be present in soil in comparison to estimated mass of 32,797.61 kg of TPH in 2015 (**Annexure – 4**).
- Based on the Groundwater analytical data and TPH Iso concentration contour maps of groundwater in shallow and deep screened wells (**Annexure -5**) the lateral extent and impact of petroleum hydrocarbon impact to groundwater was calculated.
- Residual mass in groundwater is estimated to be approximately 2.11 kg in March 2021, compared to 1,380.97 kg of TPH estimated in 2015 (**Annexure – 6**).

iv. Mass Balance Summary of TPH during 2015 – 2021

The total mass estimated in 2015 assessment, Mass removed by SVE units and absorbent socks, Mass removed by CMRL activity and unaccounted mass removed by SVE units during the high slug movement into the treatment system till February 2021 and the remaining mass present at site in 2021 are given below;

<i>Initial Mass (2015) (Kg)</i>	<i>Mass Removed by SVE (2016-2021) (Kg)</i>	<i>Mass Removed by Socks (2015-2020) (Kg)</i>	<i>Mass Removed by CMRL (2018-2019) (Kg)</i>	<i>Mass Removed by SVE units (Unaccounted)/ Natural Attenuation factors (Kg)</i>	<i>Mass Remaining (2021) (Kg)</i>
34,178.57	16,739.58	69.093	4,849.137	11,464.717	1056.043

v. Observations and recommendations of the re assessment study

- Significant reduction in soil and groundwater concentrations is being observed due to remedial efforts and natural attenuation.
- Residual mass continues to be present in the 25 to 35 feet bgs interval that warrants continuation of remediation.
- Although low concentrations of petroleum hydrocarbons are being reported in groundwater samples, not recommend to use of groundwater in private bore wells.
- Higher concentrations of DRO and TPH observed between 25 and 35 feet bgs at a few locations, hence to continue SVE systems to reduce concentration of petroleum hydrocarbons in soil for a period of at least 6 months.
- Also to continued operation of the air sparge system located at SVE Unit -2. In addition, study recommends operation of a second air sparge system at SVE Unit-1 and connecting the second AS system to wells AS-3a and SVE-8.
- And also recommend to connecting newly installed wells 26A, located in the alley, and MW-25A, located in Devi Polymer property to the SVE-2, and SVE-1 respectively.

B. To install soil Gas Probes to monitor VOCs in Vadose zone of sub-soil at 3 locations in affected area, which shall become part of revised remediation scheme;

No Soil Gas Probes to monitor VOC in Vadose zone of sub soil is installed, it is informed that “ since the low concentration in the influent air samples of the SVE system, installation of soil gas probes may not help in monitoring of VOC.”

C. To augment SVE system by connecting as many wells as possible and by operating both the SVE systems simultaneously to optimal extraction rate;

Presently operating two SVE systems to mitigate petroleum hydrocarbon impact on the subsurface near VPK Street and TH Road, Tondiarpet, Chennai. The SVE -

1 system consists of **10 HP extraction blower** & SVE -2 system consists of a **20 HP Liquid ring vacuum pump** used to extract petroleum hydrocarbon vapors from the contaminated area using vapor extraction wells. The extracted vapors are abated in a catalytic oxidizer & thermal oxidizer rated at **250 (CFM)** and **500 (CFM)** in systems SVE-1 and SVE-2, respectively. As per National Green Tribunal (NGT) court order and based on affidavit filed by CPCB on 6th July 2017, the consultant of M/s BPCL (M/s Stratus Environmental INC) obtained permission from CMRL to access the contaminated area under its control. The Stratus began operating the SVE -1 system in May 2016 and SVE-2 beginning **22nd September 2017**. SVE-1 is operated 24-hours a day and SVE -2 is being operated for **12 hours** since **10th June 2020**.

SVE -1 is connected with 8 wells (MW- 2A, 3A, 4, 5, 7, 8, 9 & MW – 16A) and SVE- 2 is connected with 7 wells (MW – 2A, 4A, 26A, SVE- 1, 11, 12). The Air sparging unit -1 is started operated at SVE-2 system and connected to 4 Sparging wells (AS – 6, ASB – 1, AS – 2, DBAS – 1). However, in SVE -1, commissioning of air compressor is under progress, it is informed that before August 31, 2021, five air sparging wells (AS-4,5,7,3a and SVE-8) will be connected to SVE -1 system.

SVE Systems –Performance Summary

- SVE system 1 has operated for **34,311 hours** since 20th May 2016 and SVE system 2 operated for **3,581 hours** since 13th January 2020 as of June 2021.
- The SVE -1 unit has extracted approx. **15,058.05 Kilograms of petroleum hydrocarbons**, as of June 2021.
- The SVE -2 unit has extracted approx. **1,887.94 Kilograms of petroleum hydrocarbons** as of June 2021.
- Total amount of petroleum hydrocarbon vapor extracted beneath the subsurface soil through SVE 1 & 2 was estimated an amount of **16,945.99 Kilograms** (Approximately) as of June 2021.

D. To take immediate steps to entrust the health impact study to ICMR ;

- As per the follow-up of CPCB, TNPCB convened meeting on 23.04.2021 through Video conference to review the status of award of health study to ICMR. The meeting was attended by the officials of CPCB, TNPCB, ICMR and BPCL. The discussions held and conclusion of meetings are as below;
 - M/s BPCL informed that they are coordinating with ICMR to entrust the study of health hazard in the oil contaminated site at Tondiarpet and also informed about they obtained technical & financial approval from corporate office for awarding the project to ICMR.
 - ICMR informed that the project proposal was considered by various committees of ICMR and also expressed that the project could not dealt directly with ICMR due to conflict of interest and influence by the funder and requested to arrange payment of cost of study either through TNPCB or CPCB.
 - ICMR also expressed the suggestion of Human Ethics committee to carrying out the health hazard study after the COVID -19 Pandemic in view of the data collection like blood and urine samples from the affected people in the oil contaminated site at Tondiarpet will not reflect the correct picture.
 - On detailed discussion, CPCB & TNPCB official asked ICMR to furnish detailed project report of National Institute of Epidemiology containing proposal of health hazard study at affected place of Tondiarpet with information on proposed date of commencement of the study. The copy of Minutes meeting is enclosed at **Annexure -7**
- As decided in the meeting, ICMR submitted the proposal vide letter dated May 12, 2021 (**Annexure -8**) to TNPCB and expressed that commencement of study only after subsidence of the COVID -19 Pandemic.
- On further follow up of CPCB, TNPCB organised meeting on 11.08.2021 at TNPCB, H.O., Chennai to review the status of ICMR to take up of project. The meeting was attended by the officials of CPCB, TNPCB, ICMR and BPCL. In the meeting ICMR expressed willingness to start the study on issue of work order

by TNPCB along with payment of 90 % of project cost. In the meeting it was convinced that payment will be routed through TNPCB either in the form of Cheque or DD drawn by BPCL in the name of ICMR, the minutes of meeting is enclosed as **Annexure .9**.

- Subsequently ICMR expressed vide mail dated August 12, 2021 that “*Since the reported number of COVID 19 cases have been reduced, we wish to undertake the study upon receipt of the funds from TNPCB, funds can be transferred from TNPCB to the account of ICMR-NIE mentioned in the mandate form or through a DD drawn in favour of “The Director, ICMR NIE”, payable at Chennai”*”
- As per the ICMR proposal, the duration of the study is 10 months (1 month for preparatory activities, 6 months for field data collection and 3 months for laboratory testing and data analysis) , the study duration starts from the date of receipt of funds.
- On receipt of proposal, TNPCB directed M/s BPCL vide letter dated 13.08.2021 to issue work order to ICMR along with release of 90% of the total project cost Rs. 1,01, 40413.00 in the mode of DD favour of “The Director, ICMR NIE” payable at Chennai and the same may be delivered to ICMR through O/o TNPCB.

2. Status of Remediation work of Oil contaminated site at Tondiarpet, Chennai

- i) BPCL installed Soil Vapour Extractions (SVE) system to extract mass of Petroleum hydrocarbons from soil and groundwater, 1st SVE was commissioned in May, 2016. The vapours extracted from wells are disposed by incineration in catalytic oxidiser.
- ii) Operation of 1st SVE system got disrupted during the year 2017 due to commencement of Chennai Metro Rail Limited works, which resulted in disconnection of underground pipe network of various monitoring wells, vapour extraction wells and air spraining wells connected to 1st SVE system. As a result,

the said SVE system was relocated and re-commissioned between September-October, 2018.

- iii) Due to limited capacity of 1st SVE system, Committee constituted by Hon'ble NGT under Chairman, CPCB directed BPCL to install additional SVE system. Accordingly, BPCL has installed 2nd SVE system in November, 2019 with vapour extraction capacity of 500 cubic feet per minute (cfm). Some of the SVE wells and Air Sparging wells are connected to 2nd SVE system located in the premises of Dal Mill property along V.P.K. Street.
- iv) During joint monitoring by CPCB and TNPCB on August 06,2021 both SVE systems were found in operation.
- v) 1st SVE system was connected with 8 Soil Vapour Extraction wells ((MW- 2A, 3A, 4, 5, 7, 8, 9 & MW – 16A). During monitoring, extraction of petroleum hydrocarbon mass was observed from all 8 wells and operating at 98 - 99 cfm against the designed capacity of 250 cfm.
- vi) At the time of inspection, 2nd SVE system was connected with 7 monitoring wells MW-16A and extraction petroleum hydrocarbon mass was observed from 5 wells only. It was operating at 210-225 cfm against the designed capacity of 500 cfm.
- vii) Monitoring team conducted performance of both SVE systems by taking gas samples from inlets and outlets. The performance of both SVE system is given at **Annexure-10**. Study indicates that 1st SVE system was operating at 1/3rd of design capacity with destruction efficiency of 58-59%, whereas 2nd SVE system was operating at 45% capacity with 98% destruction efficiency.
- viii) As per records, 1st SVE system has been operating round the clock and soil vapours extracted from 8 wells at a rate of about 27-28 cfm, which is diluted with air to 96-99 cfm. Similarly, SVE -2 was found operated for 11 -12 hrs in a day and soil vapours extracted from 5 wells at a rate of 140 – 155, which is diluted with air to 210 -225 cfm. As per the field data maintained by the operator, the hours of operation, field flow rate, inlet-outlet VOC concentration

values, system flow rate and field data of past 18 month for SVE 1 and 11 month for SVE 2 system are given at **Annexure-11**.

- ix) Monthly performance data indicates that so far about 16,945.94 kg of Gasoline Range Organics (GRO) has been extracted from soil and groundwater till June 2021 at an average of about 102.72 & 143.38 kg of GRO extracted per month through SVE 1 & 2 respectively. Summary of Monthly performance data of SVE system is given at **Annexure-12**.
- x) It was observed that vapours from different wells were extracted without air sparging in SVE 1 system. Field data indicates that the extracted vapours has only GRO which is having lower carbon ranges, however higher carbon range from soil and groundwater can be extracted through SVE system when air sparging is performed. This is evident from the fact that analysis results of groundwater indicate presence of DRO, TPH and THC which are of higher carbon ranges.

3. Water Quality study conducted by CPCB & TNPCB

A team of officials from CPCB and TNPCB carried out groundwater sampling in oil contaminated site at Tondairpet, Chennai on August 06, 2021. Samples were collected from monitoring wells located in and around the impacted area. Observations and findings of the groundwater quality study is given below:

- i) At the time of sampling it was noticed that, 7 out of 22 shallow monitoring wells were abandoned due to Chennai Metro Rail Limited (CMRL) construction works. To replace abandoned wells 5 more new wells were constructed near to abandoned wells. There was no accessibility to collect samples from 5 monitoring wells, hence remaining 15 shallow monitoring wells were monitored.
- ii) Out of 10 deep monitoring wells, 2 wells were abandoned due to CMRL works, to replace these, two more constructed to represent abandoned wells. During inspection 3 wells were not having access (being junction road and private premises), therefore samples were collected from 7 deep monitoring wells, the

details of MWs installed and map showing its location are given at **Annexure-13**.

- iii) The analysis report of groundwater samples carried out from monitoring wells on 06.08.2021 is given at **Annexure-14**.
- iv) It is observed that, groundwater quality in shallow wells located in outer delineated boundary shows no traces of any petroleum compounds. However, monitoring wells located in core area i.e MW- 2A, 4A, 15A, 16A, 25A and 30 A shows presence of TPH, DRO, THC and TOC.
- v) Similarly in Deep monitoring wells located in outer delineated boundary shows no traces of any petroleum compounds, the well located in core area i.e MW 3B & 7B reported the traces of petroleum compounds.
- vi) Concentration of Mineral Oil was found within permissible limit of 0.5 mg/L in all monitored wells..
- vii) As per the analysis report, no traces of petroleum compounds observed in South and West delineated boundary of contaminated site. However, traces of petroleum compounds were observed in core area as well as in North and South-East direction of outer delineated boundary of contaminated area.

4. Conclusions :

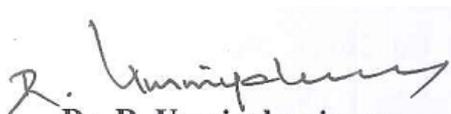
- i. M/s BPCL has taken steps to reassessment of contaminated site upon completion of CMRL works by installing new bores and additional monitoring wells, as per the assessment, concentration of petroleum hydrocarbon in soil found reduced significantly compared to 2015 data. As per Guidance document for assessment and remediation of contaminated sites, The concentration of Chemicals of Concern in soil were found less than screening levels (benzene - 0.5 mg/kg, xylenes - 5 mg/kg, toluene - 3 mg/kg, naphthalene - 1 mg/kg, ethylbenzene -5 mg/kg, TPH - 5,000 mg/kg). At a few areas high DRO and TPH concentrations continue to exist (MW-26A, MW-25AB and ASB-1) between 20 - 55 feet bgs that warrant continuation of remediation.

- ii. The groundwater analytical data indicates that concentration of petroleum hydrocarbons in groundwater within the shallow and deep-screened monitoring wells has decreased significantly since 2015. As per Guidance document for assessment and remediation of contaminated site. The concentration of Chemicals of Concern in ground water found less than screening levels (benzene at -0.005 mg/L, xylenes - 0.5 mg/L, toluene - 0.7 mg/L TPH - 0.5 mg/L and ethylbenzene - 0.3 mg/L).
- iii. As per the Mass balance summary, estimated total mass of petroleum Hydrocarbon was 34,178.57 kg (in 2015), the mass removed through remediation is 16,739.58, through socks – 69.093 kg (floating oil), through CMRL exaction – 4,849.137 kg and natural Attenuation- 11,464.717kg. Mass remaining in soil is 1056.043 kg.
- iv. Both SVEs are in operation and wells are connected to both SVE system, the inlet concentration at SVE-1 indicates the significant reduction in South and South-East direction
- v. ICMR submitted the proposal vide letter dated May 12, 2021 to TNPCB and expressed that commencement of study only after subsidence of the COVID -19 Pandemic. However, in last meeting held on August 11, 2021, ICMR expressed to commence the study on receipt of work order along with payment of 90% of project from TNPCB. Subsequently, ICMR submitted the detailed proposal along with tentative activity chart. As per that, the duration of the study is 10 months (1 month for preparatory activities, 6 months for field data collection and 3 months for laboratory testing and data analysis) , the study duration starts from the date of receipt of funds.
- vi. TNPCB directed the M/s BPCL vide letter dated August 13, 2021 to issue work order and to release 90% of project cost to ICMR to conduct health hazardous study in Tondiarpet contaminated site.

5. As per the findings of groundwater quality monitoring and the progress in carrying out health study by ICMR, the following are submitted for consideration of Hon'ble Tribunal:

- i) May grant about 10 months' time for completion of qualitative health study in affected area by ICMR with project funding from BPCL by considering the constraint due to COVID – 19 pandemic.
- ii) BPCL may optimize operation of 1st SVE system by installing air sparging to improve extraction of Higher Carbon ranges from soil.
- iii) BPCL may carryout reference soil & ground water analysis by taking samples (from different depth) from 500 mts away from the contaminated site in upward direction to understand the concentration of Hydro carbon in non-contaminated area and also to fix the target level of remediation.
- iv) TNPCB may conduct regular monitoring of ground water as well as performance of SVE systems to ensure the continues operation of remediation activity.

Hon'ble Tribunal may be pleased to pass appropriate order.



Dr. R. Umaiyakunjaram
District Environmental Engineer
TNPCB, Arumbakkam, Chennai



H.D. Varalaxmi
Sc. E & Regional Director
CPCB, Regional Directorate (Chennai)

Item No.6 to 15:

BEFORE THE NATIONAL GREEN TRIBUNAL

SOUTHERN ZONE, CHENNAI

Original Application No. 176/2013
(SZ) (Earlier O.A. No. 562/2018)

With

Original Application No. 34/2014
(SZ) (Earlier O.A. No. 563/2018)

With

Original Application No. 35/2014
(SZ) (Earlier O.A. No. 564/2018)

With

Original Application No. 36/2014
(SZ) (Earlier O.A. No. 565/2018)

With

Original Application No. 37/2014
(SZ) (Earlier O.A. No. 566/2018)

With

Original Application No. 38/2014
(SZ) (Earlier O.A. No. 567/2018)

With

Original Application No. 39/2014
(SZ) (Earlier O.A. No. 568/2018)

With

Original Application No. 40/2014
(SZ) (Earlier O.A. No. 569/2018)

With

Original Application No. 41/2014
(SZ) (Earlier O.A. No. 570/2018)

With

Original Application No. 42/2014
(SZ) (Earlier O.A. No. 571/2018)

V.P. Krishnamoorthy

Versus

....Applicant(s)

The Union of India & Ors.

....Respondent(s)

WITH

K.S. Jayaraman

....Applicant(s)

The Union of India & Ors.

Versus

....Respondent(s)

WITH
 R. SelviApplicant(s)
 Versus
 The Union of India & Ors.Respondent(s)

WITH
 K. UmachandranApplicant(s)
 Versus
 The Union of India & Ors.Respondent(s)

WITH
 Smt. S. ShanthiApplicant(s)
 Versus
 The Union of India & Ors.Respondent(s)

WITH
 G. Mahesh KumarApplicant(s)
 Versus
 The Union of India & Ors.Respondent(s)

WITH
 Smt. R. VijayaApplicant(s)
 Versus
 The Union of India & Ors.Respondent(s)

WITH
 K. Sampath KumarApplicant(s)
 Versus
 The Union of India & Ors.Respondent(s)

WITH
 K. KamalakannanApplicant(s)
 Versus
 The Union of India & Ors.Respondent(s)

WITH
 G. PurushothamanApplicant(s)
 Versus
 The Union of India & Ors.Respondent(s)

Date of hearing: 27.05.2021.

CORAM:

HON'BLE MR. JUSTICE K. RAMAKRISHNAN, JUDICIAL MEMBER

HON'BLE MR. Dr. K. SATYAGOPAL, EXPERT MEMBER

O.A. No.176/2013:

For Applicant(s): Mr. R. Barathwaj Ramasubramaniam for
Mr. A. Yogeshwaran.

For Respondent(s): Dr. V.R. Thirunarayanan for R2.
Mr. C. Kasirajan through
Ms. D. Ashwini for R3.
Mr. Saravanan represented
M/s. A.A.V. Partners for R4.
Mr. Arjun Suresh represented
Mr. R. Senthil Kumar for R5.
Mr. M.R. Gokul Krishnan for R7.
Mr. S. Sivathanu Mohan represented
M/s. Ramasubramaniam Associates for R6 to R16.
Mr. Kumaresan represented
M/s. King & Partridge for R8.
Mrs. Jayalakshmi represented
Mr. D.S. Ekambaram for R12.

O.A. No.34 to 42 of 2014:

For Applicant(s): Mr. Kandhan Doraisamy.

For Respondent(s): Mr. M.R. Gokul Krishnan for R2.
Mr. S. Sivathanu Mohan represented
M/s. Ramasubramaniam Associates for R3.
Dr. V.R. Thirunarayanan for R4.
Mr. C. Kasirajan through
Ms. D. Ashwini for R5.

Mr. Kumaresan represented
M/s. King & Partridge for R6.
Mr. Saravanan represented
M/s. A.A.V. Partners for R7.
Mr. Arjun Suresh represented
M/s. Dua Associates for R8.

ORDER

1. As per order dated 08.07.2020, this Tribunal had considered the various reports filed by the Central Pollution Control Board and also directions issued and thereafter, passed the following order:-

“6. So considering the circumstances that the remediation process is still in progress, we direct Central Pollution Control Board to consider the objections filed by BPCL in respect of their report regarding the deficiencies in the present method of remediation if any, or any other direction is to be given in that regard and after conducting scientific study such direction can be given by them. BPCL is directed to complete the tender process for entrusting to Indian Council of Medical Research to conduct the health study at the earliest so that the Indian Council of Medical Research can proceed with the study and submit the report to CPCB who can forward the same to this Tribunal along with their status report regarding the progress of remediation that is going on along with further direction if any given by them after considering the objection filed by BPCL in respect of the deficiencies noted by them in the present remediation process of remedying the soil contamination.

7. Considering the circumstances, we feel it appropriate to grant six months time to both parties to comply with the direction and also file the future progress

report along with the health report to be submitted by the agency viz., Indian Council of Medical Research. Since learned counsel appearing for applicants in O.A.Nos.34 to 42 of 2014 submitted that the direction to supply drinking water may be extended, learned counsel appearing for BPCL submitted that they are undertaking that social obligation and they will provide the same continuously in future as well till the completion of remediation process and water quality improvement in that area. CPCB is also directed to submit the status report regarding the high level meeting to be conducted as directed by this Tribunal by order dated 8.2.2019 and if it is not done, the reason for the same as well. They can coordinate that meeting for the purpose mentioned in that order. Then they can submit the proceeding of such meeting as well to this Tribunal.”

2. The case was posted to 16.12.2020 for filing the report. Thereafter, the matter has been adjourned from time to time by successive notifications and lastly, it was adjourned to today by notification dated 21.05.2021.
3. When the matter came up for hearing today through Video Conference, in O.A. No.173/2013, Mr. R. Barathwaj Ramasubramaniam represented Mr. A. Yogeshwaran counsel appearing for the applicant. Dr. V.R. Thirunarayanan represented 2nd respondent, Mr. C. Kasirajan through Ms. D. Ashwini represented 3rd respondent, Mr. Saravanan represented M/s. A.A.V. Partners for 4th respondent, Mr. Arjun Suresh represented Mr. R. Senthil Kumar counsel appearing for 5th respondent, Mr. M.R. Gokul Krishnan represented 7th

respondent, Mr. S. Sivathanu Mohan represented M/s. Ramasubramaniam Associates for respondents 6 to 16, Mr. Kumaresan represented M/s. King & Partridge for 8th respondent, Mrs. Jayalakshmi represented Mr. D.S. Ekambaram counsel appearing for 12th respondent.

4. In O.A. Nos. 34 to 42 of 2014, Mr. Kandhan Doraisamy represented the applicant in all the cases. Mr. M.R. Gokul Krishnan for 2nd respondent, Mr. S. Sivathanu Mohan represented M/s. Ramasubramaniam Associates for 3rd respondent, Dr. V.R. Thirunarayanan represented 4th respondent, Mr. C. Kasirajan through Ms. D. Ashwini represented 5th respondent, Mr. Kumaresan represented M/s. King & Partridge for 6th respondent, Mr. Saravanan represented M/s. A.A.V. Partners for 7th respondent, Mr. Arjun Suresh represented M/s. Dua Associates for 8th respondent.
5. The Central Pollution Control Board (CPCB) has filed a status report dated 15.12.2020 e-filed 09.03.2021 and received on 10.03.2021 which reads as follows:-

“Compliance Status Report on High Level Committee meeting conducted and Action taken to comply with committed action plan in the matter of O. A. No 176 of 2013 (SZ) (Earlier OA No 562 of 2018 (PB)), V. P. Krishnamurthy Vs Union of India & Ors, as per order dated 08.07.2020.

Background:

The Hon'ble National Green Tribunal, Southern

Bench, Chennai, in the matter of O. A. No. 176 of 2013 (SZ) (Earlier O. A. No. 562 of 2018); V. P. Krishnamoorthy Vs. Union of India & Ors, passed order dated 08.07.2020 that:

"Considering the circumstances, we feel it appropriate to grant six months' time to both parties to comply with the direction and also file the future progress report along with the health report to be submitted by the agency viz., Indian Council of Medical Research. Since learned counsel appearing for applicants in O. A Nos., 34 to 42 of 2014 submitted that the direction to supply drinking water may be extended, learned counsel appearing for BPCL submitted that they are undertaking that social obligation and they will provide the same continuously in future as well till the completion of remediation process and water quality improvement in that area. CPCB is also directed to submit the status report regarding the high level meeting to be conducted as directed by this Tribunal by order dated 08.02.2019 and if it is not done, the reason for the same as well. They can coordinate that meeting for the purpose mentioned in that order. Then they can submit the proceeding of such meeting as well to this Tribunal.

A copy of the said order is annexed at Annexure-I

1. Status of High Level Committee Meeting In compliance to Hon'ble NGT order dated 08.02.2019, a joint meeting at the high level was held on 01.03.2019 under Chairman CPCB; along with Chairman, TNPCB; CMD, M/s Chennai Metro Rail Corporation Ltd., (M/s. CMRL) and CMD, M/s. Harat Petroleum Corporation Ltd (M/s. BPCL), to take stock of the situation on remediation of BPCL oil contaminated site at Tondiarpet, Chennai. Joint committee has outlined a time bound action plan for remediation of BPCL Oil contaminated and the same was submitted before the Hon'ble NGT, Principal Bench, New Delhi vide CPCB's compliance status report dated 08.03.2019. Copy of the same is given at Annexure-II. CPCB reviewed the status of action taken by IWS BPCL and submitted compliance status report dated

16.09.2019, before Hon'ble NGT. A copy of the report is given at Annexure-III. Subsequently, Hon'ble NGT had passed an order dated 18.09.2019 that;

“the CPCB directed to undertake that process in Coordination with ICMR and the State Pollution Control Board and conduct a study on health Hazards that has happened in that area and what is the compensation payable for the locality people on account of the contamination of ground water due to the seepage of the oil from the oil refineries due to leakage of the pipelines of BPCL”.

2. Steps taken by CPCB in compliance of Hon'ble NGT order 18.09.2019

i. CPCB requested TNPCB vide letter dated 18.10.2019 to engage Indian Council of Medical Research (ICMR) and to organise a meeting with BPCL to decide time bound action plan to complete the study on health hazards.

ii. Accordingly, TNPCB convened meeting on 19.11.2019 at TNPCB, H.O., Chennai to discuss the scope and modalities of health study. The meeting was attended by the officials of CPCB, TNPCB, ICMR, M/s BPCL, and representative of M/s Environment Stratus (the consultant for remediation of oil contaminated site). Representatives of ICMR and M/s BPCL were apprised about the requirement of conducting health studies in time bound manner.

iii. Representatives of ICMR explained the procedures involved in qualitative health impact study and possible effects of VOC emissions on human health. They also explained that a field study would be necessary to prepare project proposal with detailed scope of work. ICMR had agreed to take-up the study.

iv. As decided in the aforesaid meeting, a team of Scientists from ICMR visited the oil contaminated area along with officials of TNPCB for understanding the site conditions. A consultative meeting was also held on 06.01.2020 involving team of experts from ICMR-NIE (Indian Council of Medical Research Institute - National

Institute of Epidemiology), General Medicine (Madras Medical College), Environmental Engineering Department (IIT-Madras), National Institute of Occupational Health (ICMR-NIOH) and National Institute of Epidemiology (ICMR-NIE) to discuss and finalise the work plan for study, including health impact of the population exposed to oil pipeline-leak in Tondiarpet as well as in unexposed population in Roypuram area in Chennai.

v. Subsequently, ICMR prepared a detailed proposal comprising scope of work, methodology, procedure for quantification of health impacts including project cost and timelines to complete the study. The said proposal was submitted on 28.02.2020 to TNPCB and GPCB. Accordingly, CPCB, Regional Director, Bengaluru coordinated with TNPCB and BPCL to expedite award of project to ICMR (a copy of the letter is annexed at Annexure-IV).

vi. CPCB submitted the progress report before this Hon'ble NGT (sz) on 18.03.2020 and requested to grant about 6 months' time for completion of qualitative health study by ICMR. Hon'ble NGT in its hearing dated 08.07.2020 considered the request and granted six months' time to both BPCL and ICMR to comply with direction and also file the future progress report along with the health report of ICMR.

3. Progress made in compliance of Hon'ble NGT order dated 08.07.2020

i. CPCB, Regional Directorate, Bengaluru followed up with M/s. BPCL vide letter dated 17.08.2020 to complete the following tasks and to submit the Action Taken Report to CPCB (a copy of the letter is annexed at Annexure-V):

a) As per the action plan decided in joint committee at the high level under the chairmanship of Chairman, CPCB on 01.03.2019 - upon completion of CMRL soil excavation works, IWS BPCL to submit a Detailed Project Report (DPR) for revised remediation scheme based on re-assessment of site along with site specific target levels (SSTLs) for remediation based on

human health risk assessment. BPCL was requested to submit action plan within a week.

b) Install Soil Gas Probes to Monitor VOCs in Vadose zone of sub-soil at 3 locations in affected area, which shall become part of revised remediation scheme.

c) To augment SVE system by connecting all available wells to both SVE system and to operate both SVE system continuously to optimise soil vapour extraction.

d) To take immediate steps to entrust the health impact study to ICMR, so as to complete the said study before November 30, 2020 and submit the study report to TNPCB/CPCB.

ii. In response to CPCB letter, M/s. BPCL has submitted a work plan for post CMRL assessment works vide its letter dated 21.09.2020. CPCB has examined the said proposal and communicated point wise observations to TNPCB vide letter dated 22.10.2020 with request to review the proposal with additional inputs, if any at their end and to communicate the same to M/s BPCL for initiating post CMRL construction site assessment (a copy of the CPCB letter dated 22.10.2020 Annexure-VI).

iii. CPCB has also sent reminder to TNPCB vide letter dated 11.12.2020 with request to coordinate with M/s BPCL for awarding the project to ICMR and complete the study in time bound manner.

Prayer

CPCB made all its effort to comply with directions of Hon'ble NGT, hence it humbly prayed that, Hon'ble Tribunal may issue suitable directions as below:

a. TNPCB to review the work plan forwarded by CPCB and may authorise M/s BPCL for initiating re-assessment of site in post construction stage of CMRL works.

b. TNCPB to intervene for early completion of health impact study through ICMR by coordinating with M/s BPCL to award the work, as the outcome of the study would help in assessing the compensation payable to the locality people for any possible health impacts on

account of contamination of groundwater due to leakage of oil from pipelines of M/s BPCL.

c. This answering Respondent No. 12 shall abide to any directions passed by the Hon'ble Tribunal”

6. In this report, they have prayed for issuing directions namely,
- (a) Tamil Nadu Pollution Control to review the work plan forwarded by the Central Pollution Control Board and may authorize M/s. BPCL for initiating re-assessment of site in post construction stage of CMRL works and (b) Tamil Nadu Pollution Control Board to intervene for early completion of health impact study through ICMR by coordinating with M/s. BPCL to award the work, as the outcome of the study would help in assessing the compensation payable to the locality people for any possible impacts on account of contamination of ground water due to leakage of oil from pipeline M/s. BPCL.
7. Further, they also filed a reply affidavit with regard to the objection filed by M/s. BPCL to their earlier report which reads as follows:

“Reply affidavit on behalf of Central Pollution Control Board (Respondent No, 12) with regard to Objection filed by Bharat Petroleum Corporation Ltd., w.r.t Status report dated 16.03.2020 of the Central Pollution Control Board.

1. I, S. Suresh, Son of S.R. Sathyanarayana, Hindu, aged about 57 years, having office at the Regional Directorate (South), Central Pollution Control Board, 1st & 2nd Floors, Nisarga Bhavan, A- Block,

Thimmaiah Main Road, 7th D Cross, Shivanagar, Bengaluru - 560 079 do hereby solemnly affirm and sincerely state as follows:-

2. That I am presently working as Scientist 'E' & Regional Director, Regional Directorate (South), Central Pollution Control Board (hereafter called as CPCB), Bengaluru and have been authorized to file the present compliance affidavit. I am fully conversant with the facts of the case and hence, competent and authorized to depose and swear the present compliance affidavit as under:

3. That in compliance of Hon'ble NGT order dated 18.09.2019, CPCB coordinated with Indian Council for Medical Research (ICMR) and Tamil Nadu Pollution Control Board (TNPCB) and convened meeting on 19.11.2019 at TNPCB, H.O., Chennai to discuss the scope and modalities of health impact study. The meeting was attended by the officials of CPCB, TNPCB, ICMR, BPCL and representative of M/s. Environment Stratus (Consultant for remediation of oil contaminated site). IN the said meeting, representatives of ICMR and BPCL were apprised about the requirement of conducting health studies in time bound manner.

4. Subsequently, ICMR prepared a detailed proposal comprising scope of work, methodology, procedure for quantification of health impacts including project cost and timelines to complete the study. ICMR submitted the proposal to TNPCB and CPCB on 28.02.2020. Thereafter, CPCB, forwarded the ICMR proposal to BPCL and TNPCB vide letter dated 28.02.2020 with request to expedite award of project to ICMR.

5. Further, as per the directions of Hon'ble NGT, CPCB and TNPCB have carried out groundwater monitoring as well as performance of Soil Vapour Extraction System installed by BPCL for remediation of oil contaminated site at Tondiarpet. The report was submitted before Hon'ble NGT on 16.03.2020.

6. That Hon'ble Tribunal heard the matter on March 18, 2020, and on the request of Respondent No. 6 (M/s. BPCL), adjourned the matter for allowing filing the objections by them. M/s. BPCL has filed the objections on June 09, 2020 the same was received through CPCB counsel. That para wise reply from CPCB on the said objections are as below:

Para 1 to 14:

7. It is submitted that with respect to averments made in para 1 to 14 are about General information, ongoing remediation work and its status, hence no comments to offer from this Respondent No. 12.

8. Para 15: "With regard to Point No. I of the Status Report dt. 16.03.2020 (i.e.) BPCL awarding the work of conducting the Health study to ICMR, it is submitted that BPCL had obtained approval from its management to float the tender. Further, by email dt. 24.04.2020 and 06.05.2020, BPCL has requested for detailed specifications, scope of work job description, estimate cost item wise, timelines, vendor registration by ICMR and other details from CPCB in order to float the tender. The details are awaited from CPCB. BPCL is awaiting for the reply from CPCB on the details sought for floating the tender. "

CPCB Reply:

That as per the direction of Hon'ble NGT, as a committee member CPCB taken lead role to convene the meeting with ICMR and follow-up with ICMR to obtain the detailed proposal comprising scope of work, methodology, procedure for quantification of health impacts including project cost and timeline to complete the study and the same was sent to BPCL vide letter dated February 28, 2020 (Annexure - 1, 2, 3) with request to expedite award of project to ICMR. However, no official communication has been received from BPCL, after lapse of fifty-six days CPCB received mail from BPCL, the matter of mail is as below:

"Please help us with following details to float the

single tender to ICMR.

1. Detailed specifications of tender
2. Scope of work, job description and estimate cost item wise, timelines for the job, LD clause etc.
3. Vendor registration template in the format (enclosed) duly filled and submit by vendor (ICMR) to register them. (ICMR need to provide their registration / incorporation certificate, GSTN copy and other details as per the format enclosed)"

That it is the responsibility of BPCL to justify placing single tender on ICMR. Since ICMR has submitted the detailed technical and financial proposal, BPCL might have sought required clarifications from ICMR and request CPCB/TNPCB to convene a meeting with ICMR. Further, it is humbly submitted that GPCB may not justify or recommend tendering terms, which may be finalised between ICMR and BPCL following the established procedures of respective agencies.

9. Para 16: "With regard to Point No. 2 of status Report dated 16.03.2020 (i.e.) the findings of the ground water quality study conducted by CPCB and TNPCB, it is submitted the remedial activity at the site has resulted in reduction of ground water concentrations. The concentration of chemicals of concern although above laboratory detection limits, are reducing in the wells sampled. Chemicals of concern at this site are DRO, GRO and BTEX. It is important to note that CPCB has not established permissible limits for the chemicals of concern at this site."

CPCB Reply:

That in reply to points raised by M/s. BPCL at para 16, CPCB submit the following facts before Hon'ble NGT:

On receipt of complaints dated July 14,2013 regarding Petroleum impact in bore wells located in the public domain on TH road and VP Koil Street at Tondiarpet, Chennai; CPCB/TNPCB inspected and directed BPCL to discontinue the damaged pipelines

carrying petroleum products and also directed to take up detailed study to assess the extent of contamination and its remediation. As per the direction of Hon'ble NGT, BPCL engaged the experts from IIT Madras in November, 2013 and conducted initial evaluation and prepared tender documents, scope of work for the remediation work. Accordingly, BPCL engaged the consultant M/s. Stratus Environment in December, 2014 to carry out remediation of oil contaminated site under the supervision of IIT Madras. In the remedial works initiated under guidance from IIT, Madras, risk assessment studies were not carried out to derive site specific target levels.

While hearing the matter on March 17, 2016, the Hon'ble NGT implead the CPCB and passed an order that "till date no remediation measures worthy of speaking has been taken in the interest of the residents in the area, we discharge the experts from IIT-M from any further supervision over the remediation efforts and directed the CPCB to take up the supervision of remediation work of erasing oil contamination in the water aquifer in Tondiarpet taking into consideration all the reports of experts of IIT-M as well as the Board and file its report by next date of hearing. In this exercise the CPCB is permitted to avail the service and /or expertise from any recognised Organisation/ institute located in the Country. The cost involved for the said purpose shall be fully borne by the BPCL (Annexure-4)".

That in compliance to the aforesaid order, CPCB has inspected the oil contaminated site at Tondiarpet along with the officials of TNPCB on April 05, 2016 and reviewed the status of remediation works. The salient observations vis-a-vis recommendations communicated to BPCL vide CPCB letter dated April 27, 2016 (Annexure - 5). The major salient observations are as below:"

(4) The remedial measures initiated are not based on any quantifiable risk reduction. There is need to set standards for remediation based on reduction in risk at the receptor rather than just operating a soil vapour

extraction system. It is therefore suggested that the scope of work to the consultant should include a quantitative risk assessment. Tier-1 screening of the soil and groundwater may be carried out using Canadian screening standards and Dutch intervention values.

(8) Based on site specific target levels derived from risk assessment, the consultant shall evaluate multiple remedial options that may be required beyond soil vapour extraction system including proposal for long term plan for assessment and monitoring may be submitted to TNPCB and CPCB within a period of 4 months. Short term findings on performance of SVE system may be included in this report.

(10) Target level for remediation shall be set based on quantitative risk assessment and such target level shall be authorised by TNPCB to monitor the remediation works."

CPCB reviewed implementation of above recommendations and the project status including reasons given by BPCL for not implementation of aforesaid suggestions were submitted to Hon'ble NGT vide status report dated November 16,2016 (Annexure - 6). The extracted paragraph of status report of CPCB dated November 16,2016 is as below;

"(iii) As per the CPCB recommendations, it is required to set Site Specific Target levels (SSTL) to be derived from quantitative risk assessment using any suitable model based on the human health risk associated with both inhalation and incidental ingestion of specific contaminants at the exposure concentration and SPR (Source- Pathway-Receptor) linkage. M/s. BPCL has not made any progress in developing SSTL, however, excavation of contaminated soil for the proposed Metro construction may alter the source pathway receptor considerations for developing the SSTL, therefore it may be appropriate to develop SSTL at later stage."

It is submitted that as per directions of Hon'ble NGT, CPCB has been monitoring ground water quality

and performance of soil vapour extraction system and effectiveness of remediation is reported in comparison to previously observed values. Since excavation works of CMRL are nearing completion in impacted area, M/s. BPCL may carry out risk assessment studies by engaging a reputed remediation consultant and proposed Site Specific Target levels (SSTL) may be submitted to TNPCB for acceptance or authorization of remediation standards.

10. Para 17: "With regard to the statement that there is presence of TOC, TPH and DRO in the 4 deep bore wells, it is stated that these wells historically have detectable concentrations of petroleum hydrocarbons. Similar to the shallow wells, the concentration of chemicals of concern are declining. For example concentration of DRO in well MW-5 B was initially reported to be 19.81 mg/L in December 2015, but the current concentration as reported by CPCB is 0.193 mg/L. Further, with regard to the statement that the concentration of mineral oil was found within permissible limit in all monitored wells except in one location (MW-58), it is stated that the initial concentration of mineral oil in MW-5 B was reported to be 9.44 mg/L in December 2016 and current concentration reported by CPCB is 0.82, indicating a significant reduction in concentration.

CPCB Reply:

That as per the directions of Hon'ble NGT, CPCB initiated monitoring of groundwater since June, 2016 by selecting 9 monitoring wells installed in core area as well as in boundary of contaminated site and the status report showing fluctuation of concentrations of chemicals of concern in groundwater was submitted to Hon'ble NGT vide CPCB status report dated January 05, 2018 (Annexure-7). The report revealed that "concentration of Mineral Oil and Gasoline Range of Organics (GRO) found less than 0.01 mg/L and 20 µg/L, respectively in most of monitoring well locations. However, concentration of Diesel Range of Organics (DRO), Total Petroleum

Hydrocarbon (TPH) and Total Hydrocarbon (THC) in groundwater indicates that the present system of operation of SVE could not establish the satisfactory reduction".

Due to ongoing Metro excavation and seasonal variation of groundwater, monitoring wells identified by CPCB (except MW-5B) were either closed or dried-up. In contrary to claims of IWs BPCL, comparison of TOC, DRO and THC levels in monitoring well MW-5B, in samples collected on 22 November, 2017 and 14 February, 2020 indicates clear increment in concentrations values from 14 mg/L, 0.089 mg/L & 0.272 mg/L to as high as 64 mg/L, 0.193 mg/L & 1.01 mg/L respectively, however such increment may be attributed to movement of groundwater and change in hydro-geological conditions due to CMRL works. CPCB monitoring has also indicates that low concentrations in other wells, however over-all remediation efficiency cannot be decided based on monitoring of few wells. Therefore, based on observed groundwater quality CPCB concluded that the present system of operation of SVE could not establish the satisfactory reduction in groundwater contamination. It is therefore necessary to augment SVE system by connecting as many wells as possible and by operating both the SVE systems simultaneously to optimal extraction rate. The observations of BPCL claiming significant reduction in concentration is not acceptable.

PRAYER

That it is humbly submitted prayed that Hon'ble NGT may issue suitable direction to BPCL to;

1. Issue suitable direction to M/s. BPCL to carry out detailed site investigation and risk assessment study to evolve Site Specific Target Levels (SSTLs) for remediation of oil contaminated site at Tondiarpet, Chennai;

2. Direct M/s. BPCL to augment SVE system by connecting as many wells as possible and by operating both the SVE systems simultaneously to optimal

extraction rate;

This answering Respondent No. 12 shall abide to any direction passed by the Hon'ble Tribunal.”

8. It is seen from the reply statement that they have given a detailed reasons as to why they have come to such conclusion in their report regarding the compliance report showing some deficiencies in the SVE system and directing the M/s. BPCL to modify the same. Being an expert body on this aspect, we accept the reply submitted by the Central Pollution Control Board in this regard and direct the M/s. BPCL to carry out the directions issued by the Central Pollution Control Board as requested for in this reply statement namely, direct the M/s. BPCL to carry out detailed site investigation and risk investigation study to evolve Site Specific Target Levels (SSTLs) for remediation of oil contaminated site at Tondiarpet, Chennai and direct the M/s. BPCL to augment SVE system by connecting as many wells as possible and by operating both the SVE system simultaneously to optimal extraction rate.
9. So, M/s. BPCL is directed to carry out these directions issued by the Central Pollution Control Board as part of remediation process.
10. The learned counsel appearing for the M/s. BPCL submitted that they have already complied with the direction as

well. If that be the case, the Central Pollution Control Board is directed to inspect these areas with the Tamil Nadu Pollution Control Board and ascertain as to whether the directions issued by them have been complied with or not. If it is not complied with, then they are directed to issue further necessary direction in this regard and submit a detailed report to this Tribunal before the next hearing date.

11. The Tamil Nadu Pollution Control Board is also directed to carry out the directions issued by the Central Pollution Control Board in their status report which has been mentioned above.
12. The matter is pending since 2013 onwards and the remediation process are still in progress. Unless the remediation process is completed, it cannot be said that the purpose of directions issued by this Tribunal have been fully complied with or implemented and the damage caused to the environment has been restored to its original position.
13. Mr. Kandhan Doraisamy, the learned counsel appearing for the applicants in O.A. No.34/2014 to 42/2014 submitted that during the lock down period, the water as undertaken by the M/s. BPCL has not been supplied and when the officials were contacted, they said that they have entered into a contract with the CMWSSB for supply of water and they are doing it, but no water supply has been done.

14. When this was pointed out, the learned counsel appearing for the M/s. BPCL submitted that all arrangements have been made and they will ensure that the water supply will be properly done as undertaken by them. The officials of the M/s. BPCL are directed to look into the issue and resolve the same and comply with the direction issued by this Tribunal for supply of water to the people of the locality who have been affected on account of the contamination caused to the ground water in that area.
15. The Central Pollution Control Board as well as the Tamil Nadu Pollution Control Board and the M/s. BPCL are directed to file their further status and compliance report including the steps taken regarding further remediation process that is being suggested by the CPCB and regarding the health study that is directed to be done by the ICMR and submit the reports to this Tribunal on or before 27.08.2021 by e-filing in the form Searchable PDF/OCR Supportable PDF and not in the form of Image PDF along with necessary hardcopies to be produced as per Rules.
16. The Registry is directed to communicate this order to the members of the committee, Central Pollution Control Board, Tamil Nadu Pollution Control Board, BPCL by e-mail immediately for their information and compliance of the

direction.

17. For consideration of further compliance report and progress of the remediation process report, post on 27.08.2021.

Sd/-

.....J.M.
(Justice K. Ramakrishnan)

Sd/-

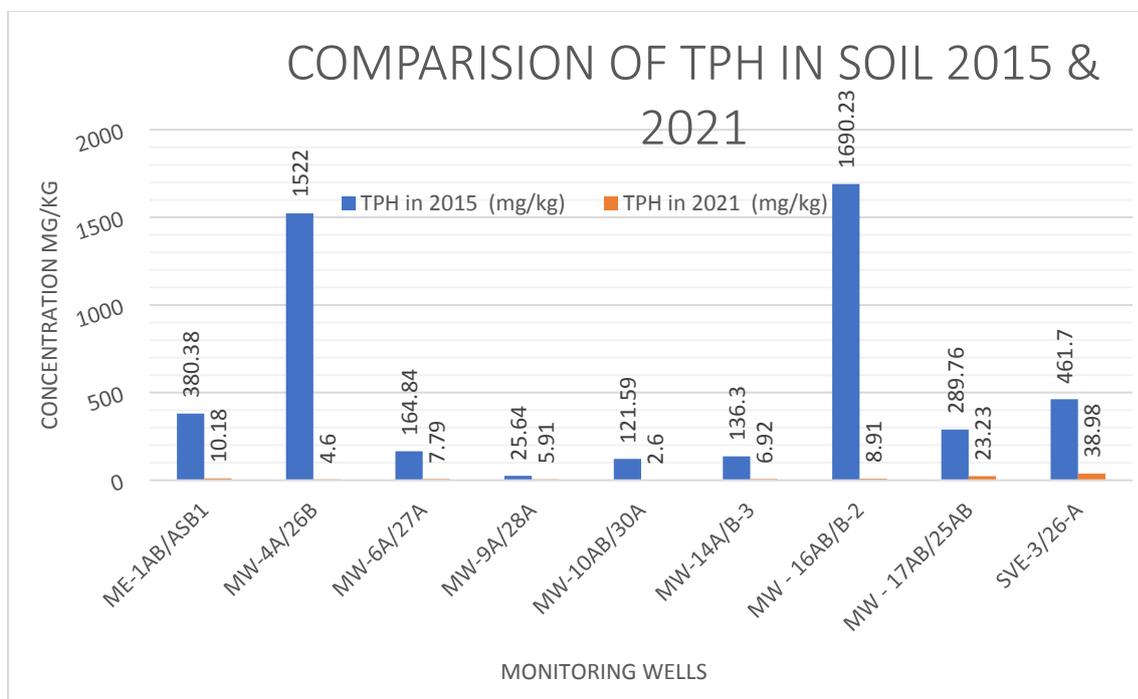
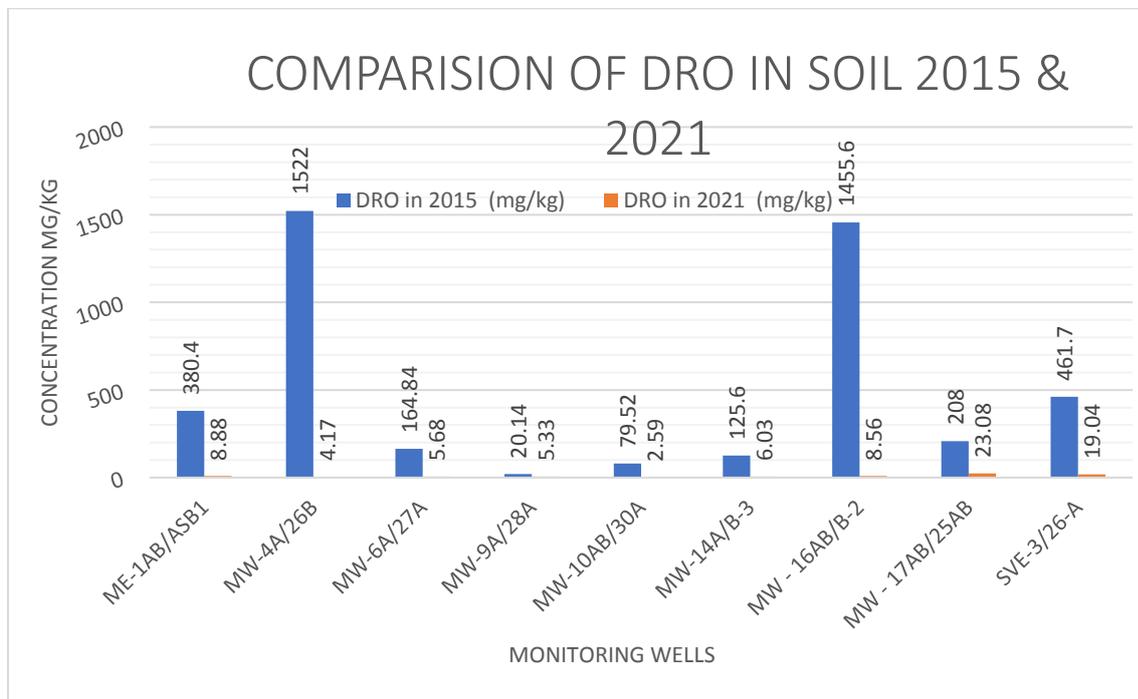
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(Dr. K. Satyagopal)

**O.A. No.176/2013,
O.A. No.34 to 42/2014,
27th May, 2021. Mn.**



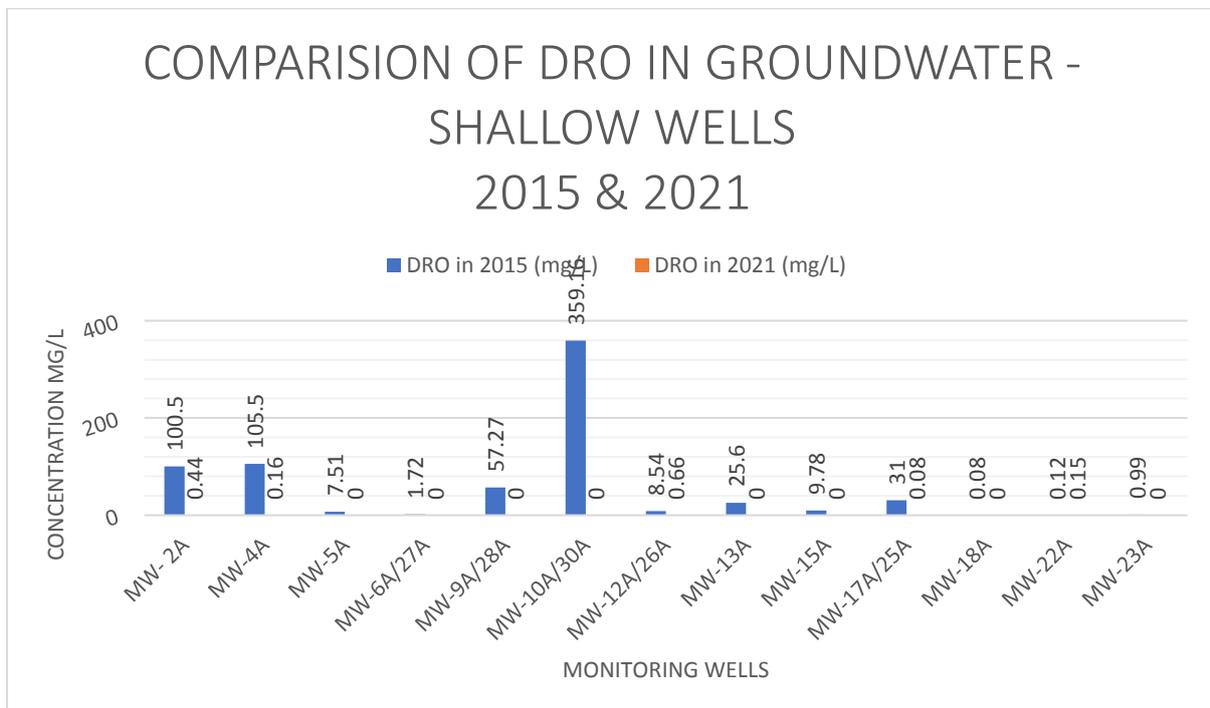
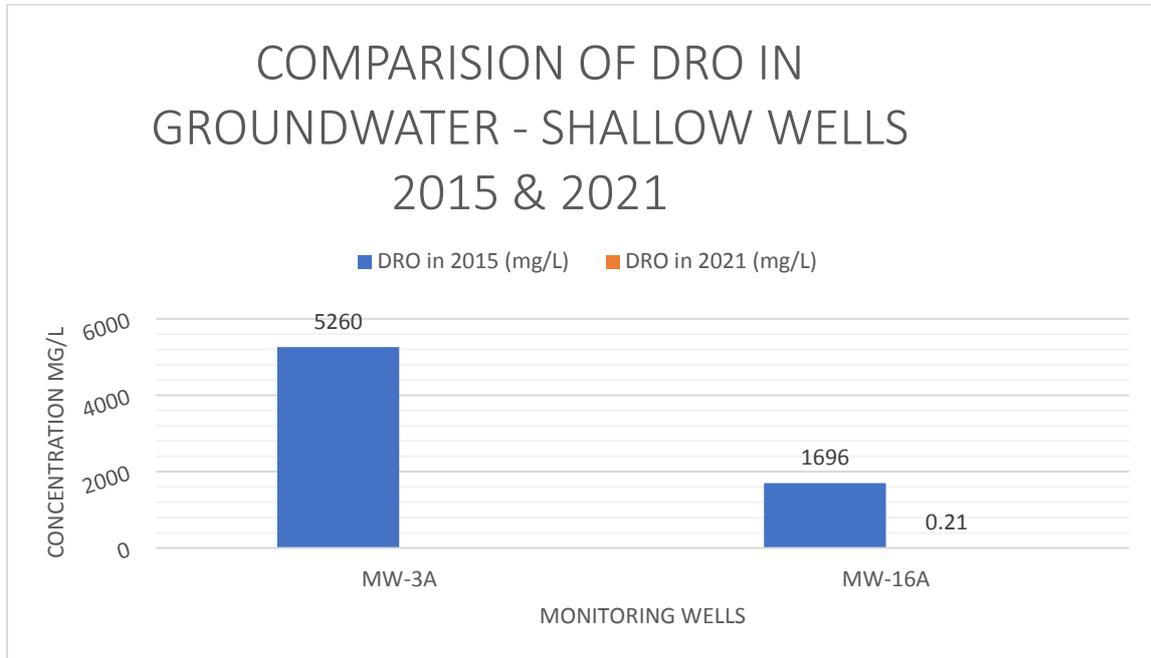
Annexure – 2

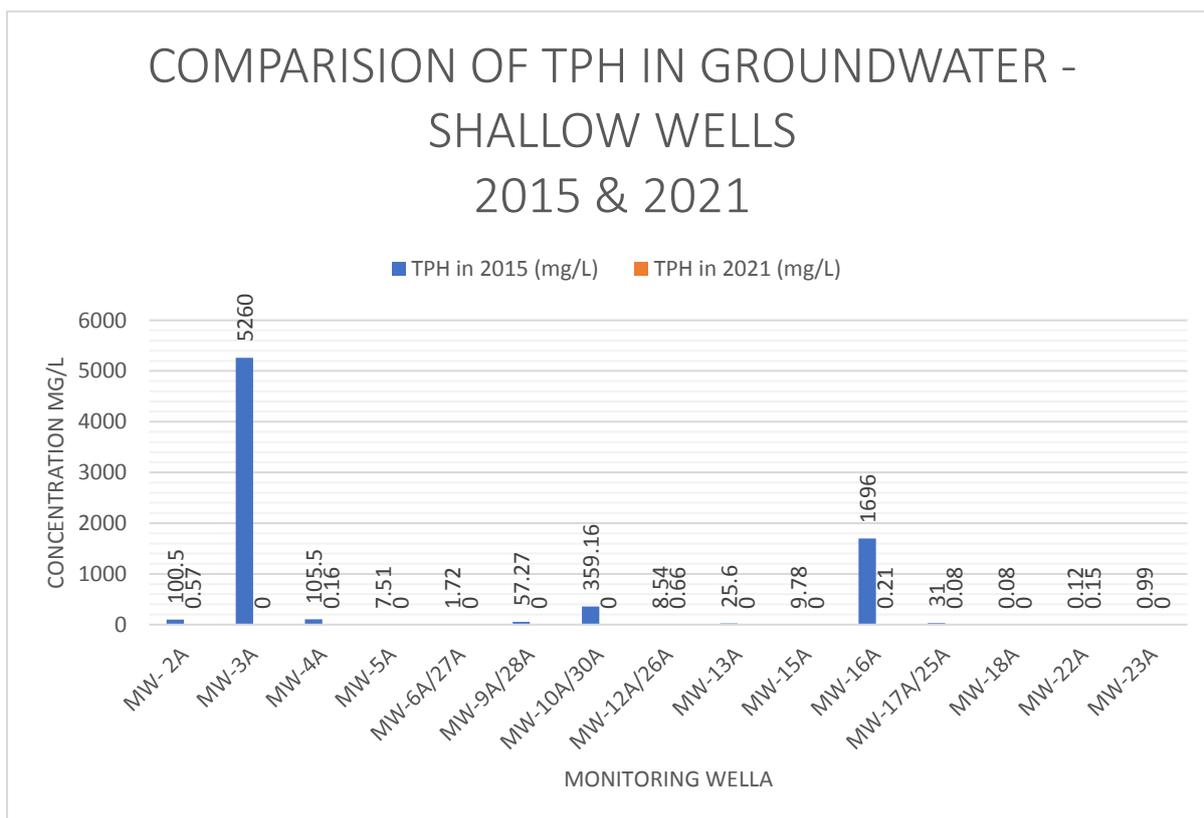
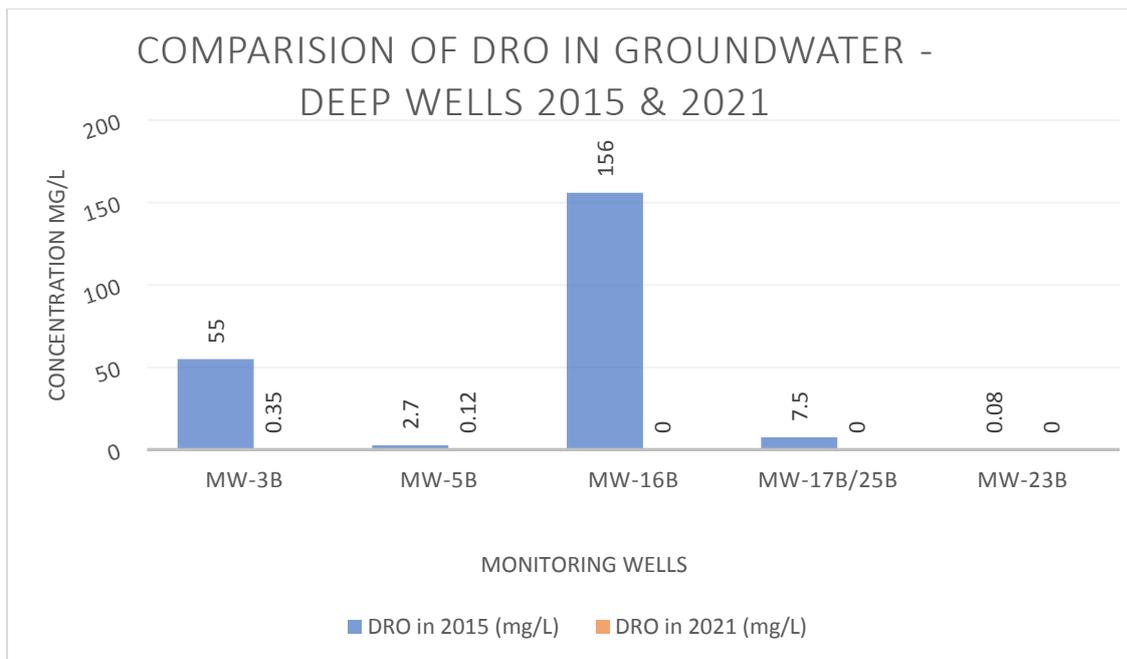
The mass reduction in terms of DRO, TPH and TOC in Soil for six year span

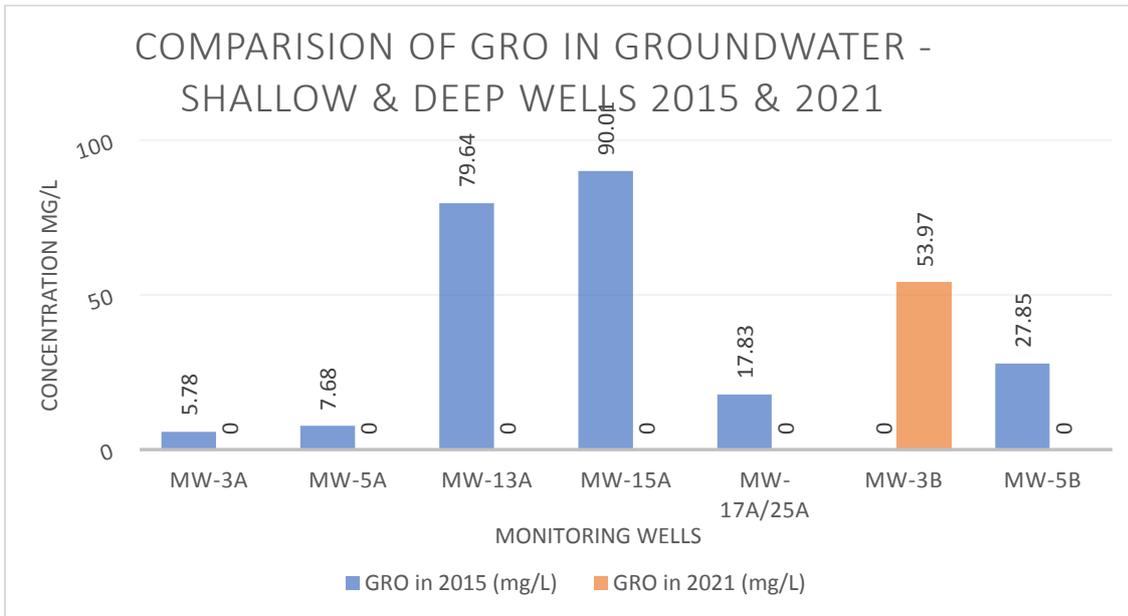
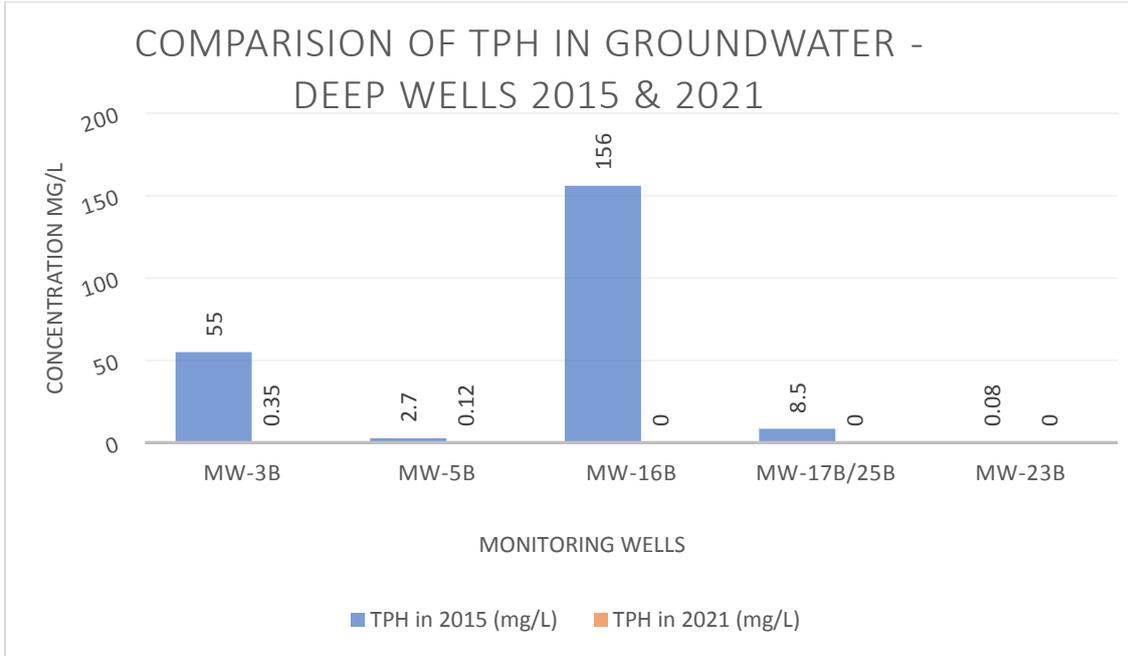


Annexure – 3

The mass reduction in terms of DRO, TPH and TOC in Ground water for six year span







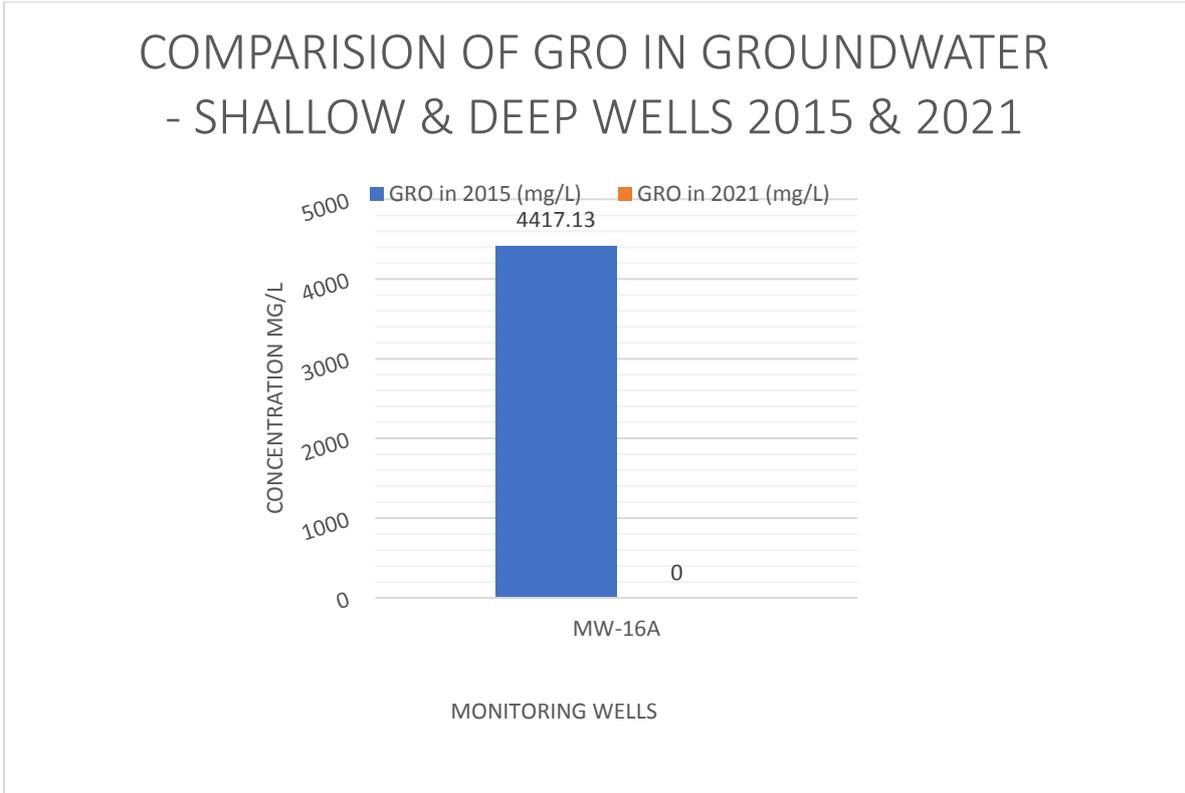


Table H-1 - DRO Mass in Soil (2015)

Bharat Petroleum Corporation Ltd.
VKP Street, Tondiarpet, Chennai

Annexure -4

Basis	Area ID	Area sq.ft	Thickness ft	Avg Conc mg/kg	Soil Volume cu.ft	Soil Density Kg/cu.ft	Soil Mass Kg	DRO Mass Kg
Figure H-1 0' - 10'	A1+A2	5,371	10	329.97	53,710	43.04	23,11,678	762.78
	B	16,255	10	55	1,62,546	43.04	69,95,967	384.78
	C	19,248	10	5.5	1,92,477	43.04	82,84,219	45.56
Mass of DRO from 0 - 10 feet bgs =								1,193.13
Figure H-2 10' - 20'	A	419	10	1850	4,188	43.04	1,80,234	333.43
	B	21,040	10	550	2,10,400	43.04	90,55,616	4,980.59
	C	11,883	10	55	1,18,831	43.04	51,14,491	281.30
	D	17,977	10	5.5	1,79,773	43.04	77,37,430	42.56
Mass of DRO from 10 - 20 feet bgs =								5,637.88
Figure H-3 20'-30'	A	1,669	10	4100	16,689	43.04	7,18,303	2,945.04
	B	23,506	10	550	2,35,061	43.04	1,01,17,008	5,564.35
	C	19,000	10	55	1,89,997	43.04	81,77,458	449.76
	D	12,772	10	5.5	1,27,716	43.04	54,96,879	30.23
Mass of DRO from 20' - 30' feet bgs =								8,989.39
Figure H-4 30'-40'	A	2,167	10	2351	21,675	43.04	9,32,875	2,193.19
	B	21,634	10	550	2,16,345	43.04	93,11,480	5,121.31
	C	6,483	10	55	64,831	43.04	27,90,339	153.469
	D	7,111	10	5.5	71,115	43.04	30,60,785	16.83
Mass of DRO from 30' - 40' feet bgs =								7,484.81
Figure H-5 40' - 50'	A	2,350	10	3334.5	23,498	33.98	7,98,472	2,662.51
	B	20,254	10	550	2,02,544	33.98	68,82,438	3,785.34
	C	9,577	10	55	95,774	33.98	32,54,384	178.991
	D	10,991	10	5.5	1,09,912	33.98	37,34,810	20.54
Mass of DRO from 40' - 50' feet bgs =								6,647.38
Total Mass of DRO in the Subsurface = 29,952.58								
Notes:								
1. The average concentration is assumed to be uniform across the chosen depth of soil profile								
2. Soil density is assumed to be 43.04 Kg/ft ³ for sand, 33.98 Kg/ft ³ for clay (Argonne National Lab, Environmental Science Division, Table 2.1, http://web.ead.anl.gov/resrad/datacoll/soildens.htm).								
3. Soil Mass = Soil Density * Soil Volume								
4. DRO Mass (Kilograms) = Soil Mass (Kilograms) * Average Concentration (Avg Conc) (milligrams*10 ⁻⁶ /Kilogram)								

Table H-2 - GRO Mass in Soil (2015)

Bharat Petroleum Corporation Ltd.
VKP Street, Tondiarpet, Chennai

Basis	Area ID	Area sq.ft	Thickness ft	Avg Conc mg/kg	Soil Volume cu.ft	Soil Density Kg/cu.ft	Soil Mass Kg	GRO Mass Kg
Figure H-6 0' - 10'	A	6,412	10	179.5	64,120	43.04	27,59,738	495.37
	B	11,094	10	55	1,10,936	43.04	47,74,668	262.61
	C	6,436	10	5.5	64,355	43.04	27,69,848	15.23
Mass of GRO from 0 - 10 feet bgs =								773.21
Figure H-7 10' - 20'	A1+A2	2,683	10	153.5	26,827	43.04	11,54,638	177.24
	B	5,364	10	55	53,636	43.04	23,08,476	126.97
	C	7,337	10	5.5	73,374	43.04	31,58,013	17.37
Mass of GRO from 10 - 20 feet bgs =								321.57
Figure H-8 20'-30'	A1+A2	5,267	10	217.5	52,670	43.04	22,66,921	493.06
	B1+B2	6,254	10	55	62,536	43.04	26,91,537	148.03
	C	7,706	10	5.5	77,061	43.04	33,16,684	18.24
Mass of GRO from 20' - 30' feet bgs =								659.33
Figure H-9 30'-40'	A	520	10	218.5	5,198	43.04	2,23,722	48.88
	B	5,241	10	55	52,410	43.04	22,55,722	124.06
	C	5,679	10	5.5	56,789	43.04	24,44,177	13.443
Mass of GRO from 30' - 40' feet bgs =								186.39
Figure H-10 40' - 50'	A	7,449	10	331.76	74,492	33.98	25,31,225	839.76
	B	3,053	10	55	30,532	33.98	10,37,471	57.06
	C	4,119	10	5.5	41,188	33.98	13,99,582	7.698
Mass of GRO from 40' - 50' feet bgs =								904.52
Total Mass of GRO in the Subsurface =								2,845.03
Total Mass of TPH in the Subsurface =								32,797.60
Notes:								
1. The average concentration is assumed to be uniform across the chosen depth of soil profile								
2. Soil density is assumed be to 43.04 Kg/ft ³ for sand, 33.98 Kg/ft ³ for clay (Argonne National Lab, Environmental Science Division, Table 2.1, http://web.ead.anl.gov/resrad/datacoll/soildens.htm).								
3. Soil Mass = Soil Density * Soil Volume								
4. GRO Mass (Kilograms) = Soil Mass (Kilograms) * Average Concentration (Avg Conc) (milligrams*10-6/Kilogram)								

Table H-3 - DRO Mass in Shallow Groundwater (2015)

Bharat Petroleum Corporation Ltd.
VKP Street, Tondiarpet, Chennai

Basis	Area ID	Area sq.ft	Thickness ft	Avg Conc mg/L	Groundwater Volume		Mass Kg	DRO Mass - Shallow Groundwater	
					cu.ft	Litres		grams	Kgs
Figure H-7	A1+A2	1,438	15	2,565.7	6,903	1,95,433	501.4218	501421.84	501.42
	B	9,256	15	550	44,428	12,57,767	691.7719	691771.90	691.77
	C	13,179	15	55	63,260	17,90,905	98.4998	98499.76	98.50
	D	22,586	15	5.5	1,08,413	30,69,173	16.8805	16880.45	16.88
Total Mass of DRO in Shallow Groundwater								13,08,573.95	1,308.57
Notes:									
1. The average concentration is assumed to be uniform across the chosen depth of saturated zone									
2. Soil porosity is assumed to be 32% (Driscoll, F.G., 1986, DROundwater and Wells, Johnson Screens USA, p. 399, Table 12.2).									
3. DRO Mass (grams) = DROundwater Vol (liters) * Average Concentration (mg/L) (micrograms*10 ⁻⁶ /gram)									
4. Average Concentration is based on the DROundwater analytical data from September 2015.									
5. Saturated thickness assumed to be 15 feet (20 to 35 feet bgs).									

Table H-4 - DRO Mass in Deep Groundwater (2015)

Bharat Petroleum Corporation Ltd.
VKP Street, Tondiarpet, Chennai

Basis	Area ID	Area sq.ft	Thickness ft	Avg Conc mg/L	Groundwater Volume		Mass	DRO Mass in Deep Groundwater	
					cu.ft	Litres	Kg	grams	Kgs
Figure H-8	A	574	10	128	1,435	40,618	5.1991	5199.07	5.20
	B	16,264	10	55	40,661	11,51,099	63.3105	63310.47	63.31
	C	9,992	10	5.5	24,981	7,07,215	3.8897	3889.68	3.89
Total Mass of DRO in Deeper groundwater								72,399.23	72.40
<p>Notes:</p> <ol style="list-style-type: none"> 1. The average concentration is assumed to be uniform across the chosen depth of saturated zone 2. Soil porosity is assumed to be 25% 3. DRO Mass (grams) = Groundwater Vol (Litres) * Average Concentration (mg/L) (micrograms*10⁻⁶/gram) 4. Average Concentration is based on the groundwater analytical data from September 2015. 5. Saturated thickness assumed to be 10 feet. 									

**TAMIL NADU POLLUTION CONTROL BOARD****From**

The Member Secretary
Tamil Nadu Pollution Control Board,
76, Mount Salai, Guindy,
Chennai – 600 032.

To

As per List of Participant

Letter No.: T2 / TNPCB / F.0173/CHN/2020/ Dated: 16 .06.2021

Sir,

Sub: TNPCB —NGT- Review on the status of action being taken by BPCL & ICMR in respect of study on health hazard in the oil contaminated site at Tondiarpet – Meeting held on 23.4.2021 through video conferencing – minutes communicated - Reg

Ref: 1. Meeting held on 23.4.2021 through video conferencing to review on the status of action being taken in respect of study on health hazard in the oil contaminated site at Tondiarpet.

The minutes of meeting held on 23.4.2021 through video conferencing organized by TNPCB regarding review on the status of action being taken by BPCL & ICMR in respect of study on health hazard in the oil contaminated site at Tondiarpet is enclosed herewith for information and necessary further action.

Encl: As stated above


For Member Secretary

To

1. Mrs. H.D Varalaxmi, Sc.E/AD,
Regional Director(south),
CPCB, Bengaluru
2. The Chief Installation Manager
M/s Bharat Petroleum Corporation Limited
No.35, Vaidyanathan Street
Tondiarpet
Chennai – 600081.
3. The Director
National institute of Epidamology(ICMR)
R 125, 3rd Avenue
Tamil Nadu housing Board



TAMIL NADU POLLUTION CONTROL BOARD

MINUTES OF MEETING CONDUCTED ON 23.04.2021 THROUGH VC (ONLINE) WITH THE OFFICIALS OF M/S. BHARAT PETROLEUM CORPORATION LIMITED (BPCL) AND NATIONAL INSTITUTE OF EPIDEMIOLOGY (ICMR) TO REVIEW THE STATUS OF ACTION BEING TAKEN BY THEM IN RESPECT OF STUDY ON HEALTH HAZARD IN THE OIL CONTAMINATED SITE AT TONDIARPET AS PER HONBLE NGT ORDER IN O.A NO.562/2019.

A meeting to review on the status of action being taken by BPCL & ICMR in respect of study on health hazard in the oil contaminated site at Tondiarpet was organized by TNPCB on 23.04.2021 through VC (online) as per the intimation of CPCB in compliance of Hon'ble NGT (PB) in its order dated:18.09.2019 in OA No.562/2019 (earlier 176/ 2013).

The officials of CPCB, TNPCB, BPCL, ICMR are participated. A list of participants of the meeting is enclosed as **Annexure -I**

This meeting was conducted in continuation to the earlier meeting held on 19.11.20219 at TNPCB Corporate Office, Guindy.

Shri R. Kannan, Additional Chief Environmental Engineer, TNPCB welcomed officials from CPCB, ICMR and BPCL. The meeting was started with brief introduction about the directions given by the Hon'ble NGT regarding conducting health hazard study in Oil contaminated site at Tondairpet and decision taken in last meeting to award this study to ICMR as per the Hon'ble NGT order. The Regional Director, CPCB asked BPCL to brief about steps taken to award the Health study to ICMR. In this regard following discussions were held in detail;

- BPCL officials informed that they are coordinating with ICMR to entrust the study of health hazards in the oil contaminated site at Tondiarpet as per the directive of Honb'le NGT. And also informed that, they obtained the technical and financial approval from corporate office for awarding the project to ICMR

Committee and Human Ethics Committee of National Institute of Epidemiology. Further, he informed that the study period will be of nine months from awarding of the work and such period may also be extended due to prevailing Covid-19 pandemic. He added that the cost of the study is estimated Rs.1.12 crore approximately and ICMR will not be dealt directly with BPCL on receiving cost of study due to conflict of interest and influence by the funder and requested to arrange payment of cost of study either through TNPCB or CPCB.

- During interaction, BPCL officials requested CPCB to advise ICMR to speed up their internal approval process so as to take up the study at the earliest.
- ICMR officials informed that Human Ethics Committee of ICMR has suggested carrying out the health hazard study after the COVID-19 situation in view of the data collection like blood and urine samples from the affected people in the oil contaminated place at Tondiarpet will not reflect the accurate information.

After detailed discussion, Regional Director (south), CPCB, finally concluded that ICMR shall furnish a detailed report obtained from National Institute of Epidemiology containing proposal of health hazard study at affected place of Tondiarpet with information of proposed date of start of the study, time duration along with cost estimation, release of fund for study etc... to CPCB & TNPCB so as to proceed further in this regard as per Hon'ble Court order.

With the above decision, the meeting was concluded


Additional Chief Environmental Engineer

OPZ
19/6/21

ANNEXURE-1List of ParticipantsOfficials of CPCB & TNPCB

1. Mrs. H.D Varalaxmi, Sc.E/AD, Regional Director(south), CPCB, Bengaluru.
2. Thiru. R.Kannan, Additional Chief Environmental Engineer, TNPCB
3. Thiru. S.Bharathidasan, Environmental Engineer, TNPCB
4. Tmt. K.Kasthuri, Assistant Environmental Engineer, TNPCB

Officials of Indian Council of Medical Research (ICMR)

1. Dr. R.Prabhu, Scientist -D, Indian Council of Medical Research(ICMR)-NIE, Chennai.
2. Dr.Bhavanishankar Bagepally, Scientist-D, ICMR
3. Dr.Ganesh, Scientist- D, ICMR

Officials of M/s. BPCL

1. Mr Rajesh Kumbhare , GM , Ops, Southern Region, BPCL
2. Mr Vijay Dsouza, DGM , Technology & HSSE, South, BPCL
3. Mr KB Reddy, Chief Installation Manager, Tondiarpet Installation
4. Mr PS Rao, Chief Ops Officer, Tondiarpet Installation



icmr
INDIAN COUNCIL OF
MEDICAL RESEARCH

NIE
NATIONAL INSTITUTE OF
EPIDEMIOLOGY

ICMR - NATIONAL INSTITUTE OF EPIDEMIOLOGY

राष्ट्रीय जानपादिक रोग विज्ञान संस्थान

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Department of Health Research
Ministry of Health & Family Welfare
Government of India

Dr. Manoj Murhekar, M.D.
Director

NO.NIE/D/TNPCB/21/ 15

12th May 2021

The Member-Secretary
Tamil Nadu Pollution Control Board
Chennai

Sir,

Sub: Tondiarpet oil leak health impact study - Submission of documents - reg.
Ref: Discussion during the virtual meeting held on 23rd April 2021 at 4 PM; Zoom meeting
ID: 889 8670 0328 - reg.

As discussed during the meeting cited above, please find enclosed the following documents for your perusal.

1. Study proposal
2. Institutional Human Ethics Committee approval
3. Budget requirement
4. Mandate form including bank account details of the Institute for transfer of funds

As you are aware that we are regularly providing the updates on processes mandated for undertaking the study. The IHEC of our Institute has approved the study in principle and suggested that the initiation of the study may be postponed till the COVID 19 pandemic subsides.

Thanks and with regards,

Sincerely,

[Dr. Manoj Murhekar]
Director

Encl: As above





TAMIL NADU POLLUTION CONTROL BOARD

From, To
Thiru R Kannan M.Tech., As per List
Member Secretary
Tamil Nadu Pollution Control
Board,
76, Mount Salai, Guindy,
Chennai - 600 032.

Letter No. T2/TNPCB/F.0173/HWM/NGT-176/2013(SZ)/2021 Dt.
11.08.2021

Sub : TNPCB-HWM- NGT- Review on the status of action being taken by M/s BPCL, ICMR in respect of - Remediation of oil contaminated site at Tondiarpet & study on health hazard in the oil contaminated site at Tondiarpet - Meeting held on 11.8.2021 at 3.00pm- minutes communicated - Regarding.

Ref: Meeting held on 11.8.2021 at 3.00 pm at TNPC Board with officials of CPCB, ICMR & BPCL

The minutes of the meeting held on 11.8.2021 organised by TNPCB regarding review on the status of action being taken by M/s BPCL & ICMR in respect of Remediation of oil contaminated site & study on health hazard in the oil contaminated site at Tondiarpet is enclosed herewith for information and necessary further action.


For Member Secretary

Encl: As above

To

1. The Regional Director
Regional Directorate (South)
Central Pollution Control Board
77-A South Avenue
Ambattur Industrial Estate
Ambattur
Chennai - 600 058.
2. The Installation Manager
M/s Bharath Petroleum Corporation Limited
Elya Mudali Street, Chennai - 600081.
3. The Director
National Institute of Epidemiology (ICMR)
R 125, 3rd Avenue
Tamil Nadu Housing Board
Ayapakkam, Chennai- 60077



TAMIL NADU POLLUTION CONTROL BOARD

MINUTES OF MEETING CONDUCTED ON 11.8.2021 WITH THE OFFICIALS OF CPCB, M/S. BHARAT PETROLEUM CORPORATION LIMITED (BPCL) AND NATIONAL INSTITUTE OF EPIDEMIOLOGY (ICMR) TO REVIEW THE STATUS OF ACTION BEING TAKEN BY THEM IN RESPECT OF STUDY ON HEALTH HAZARD IN THE OIL CONTAMINATED SITE AT TONDIARPET AS PER HONBLE NGT ORDER IN O.A NO. 176/2013 (EARLIER O.A. No. 562/2018).

A meeting to review on the status of action being taken by BPCL & ICMR in respect of study on health hazard in the oil contaminated site at Tondiarpet was organized by TNPCB on 11.8.2021 as per the intimation of CPCB in compliance of Hon'ble NGT (PB) in its order dated: 27.5.2021 in OA No.176/2013 (earlier 562/2018).

The officials of CPCB, TNPCB, BPCL, ICMR are participated. A list of participants of the meeting is enclosed as **Annexure -I**

This meeting was conducted in continuation to the earlier meeting held on 24.4.2021 at TNPCB Corporate Office, Guindy.

The Member Secretary, TNPCB welcomed officials from CPCB, ICMR and BPCL, briefed the directions given by the Hon'ble NGT in O.A No. 176/2013 in order Dt. 27.5.2021 to the Central Pollution Control Board as well as Tamil Nadu Pollution Control Board and M/s BPCL are directed to file their further status and compliance report including the steps taken regarding further remediation process that is being suggested by the CPCB and regarding the health study that is directed to be done by the ICMR and submit the reports to this Tribunal on or before 27.08.2021.

Regarding status to know on stage remediation process being carried out at site, a joint field inspection was held on 6.8.2021 with officials of CPCB, TNPCB & M/s BPCL. Further M/s BPCL has requested to apply one time Authorization under HOWM Rules 2016, through online to carry out the treatment of 5,450 KL oil contaminated water collected from CMRL construction area, as vetted by CPCB.

The ICMR consented to take up the study of health hazards immediately in the oil contaminated site at Tondiarpet as per the directive of Hon'ble NGT and ICMR will not be dealt directly with BPCL on receiving cost of study due to conflict of interest and influence by the funder and requested to arrange payment of cost of study either through TNPCB or CPCB.

Based on the above discussion following decision were taken.

- The ICMR was asked to furnish the revised time schedule of study & schedule of payment details if any to TNPCB.
- The BPCL was asked to issue work order to conduct such study to ICMR as per the proposal given by the ICMR. The release of payment for the above study shall be given, as per the payment schedule given by ICMR in the form of Demand draft to TNPCB to avoid conflict of interest.
- The BPCL shall apply one time authorization through online, under HOWM Rules 2016 for the treatment of 5,450 KL oil contaminated water collected from CMRL construction area as vetted by CPCB
- The DEE, Chennai was requested to furnish the status report on the ongoing remediation work at BPBL Tondiarpet based on the joint inspection carried out on 6.8.2021.

With the above decision, the meeting was concluded


For Member Secretary

ANNEXURE-1List of ParticipantsOfficials of CPCB & TNPCB

1. Mrs. H.D Varalaxmi, Sc.E/AD, Regional Director(south), CPCB, Bengaluru.
2. Thiru. R.Kannan, Member Secretary
3. Dr. R. Rajamanickam Joint Chief Environmental Engineer, TNPCB
4. Thiru. S.Bharathidasan, Environmental Engineer, TNPCB
5. Dr.M.Dhinakaran, Assistant Environmental Engineer, TNPCB
6. Tmt. R. Menaga, Assistant Engineer, TNPCB
- 7.

Officials of Indian Counsel of Medical Research (ICMR) NIE, Chennai

1. Dr. R.Prabhu, Scientist -D
2. Dr. B Bhavani Shankara - Scientist -D
3. Dr.B. Ganesh, Scientist -D
4. Thiru G Elavarasu, Sr. Technical Officer.

Officials of M/s. BPCL Tondiarpet Installation

1. Thiru. V. Jayakrishnan, Senior Manager (operation),
 2. Mr KB Reddy, Chief Installation Manager,
-

MEMORANDUM

TO : [Illegible]

FROM : [Illegible]

SUBJECT : [Illegible]

[Illegible text block containing the main body of the memorandum, including a summary of the issue and any recommendations or actions taken.]

Performance of Soil Vapour Extraction (SVE) system

Performance of 1 st SVE system by taking samples from inlet & outlet						
Absorbent used ----Tenax + Carbopack						
Parameter	Unit	Field inlet			SVE System inlet (dilution with air)	SVE outlet
		MW 16 & SVE 8, 9	SVE 2A & 3A	SVE 4, 5 & 7		
TVOC	ppm	0.9	13	1.7	19	7.7
VOC	mg/m ³	0.83	5.57	1.65	17.93	7.42
BTEX	mg/m ³	0.18	2.37	1.06	12.44	6.53
GRO	mg/m ³	0.22	2.57	1.304	13.38	6.76
DRO	mg/m ³	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)
TPH	mg/m ³	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)

Performance of 2 nd SVE system by taking samples from inlet & outlet						
Absorbent used ----Tenax + Carbopack						
Parameter	Unit	Field inlet			SVE System inlet (dilution with air)	SVE outlet
		MW 2A, SVE 1 & SVE 12	MW 4A & SVE 11	MW 26 A		
TVOV	ppm	33	28	0.6	42	0.8
VOC	mg/m ³	7.4	18.79	0.54	18.7	0.73
BTEX	mg/m ³	4.65	14.87	0.07	14.89	0.141
GRO	mg/m ³	4.82	15.09	0.09	15.11	0.16
DRO	mg/m ³	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)
TPH	mg/m ³	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)	BLQ(LOQ: 0.1)

SVE 1- Field data pertains to system flow rate and its concentration of past 18 month

Month & Year	Average time of operation per day (hrs/day)	No. of wells used for extraction in a day	Field inlet (without dilution)		System Inlet (inlet to SVE system, after dilution)	
			Flow in cfm	Concentration in ppm (using PID)	Flow in cfm	Concentration in ppm (using PID)
Oct 2019	23(31 d)	5	28-28.6	341-409	96-99	220-278
Nov 2019	23(30 d)	5	28.1-28.6	332-389	96-99	211-257
Dec 2019	24(31 d)	5	28-28.6	316-379	97-99	214-247
Jan 2020	24(28 d)	5	28-28.70	160-213	97-99	101-163
Feb 2020	23(29 d)	5	27.10-28.70	123.25-229.50	97-99	49-159
Mar 2020	24(23 d)	5	28-29	206-274	97-99	49-73
April 2020	9(9 d)	5	27.40-29	229-284	97-98.90	54-69
May 2020	11(26 d)	5	27.80-29	206-284	97-99	49-73
Jun 2020	21(26 d)	5	27.80-29	359-455	97-99	159-249
July 2020	23(27 d)	5	28.10-29.10	384-437	97.80-98.90	189-238
Aug 2020	22(26 d)	5	0.00-28.70	0.00-435	0.00-98.70	0.00-242
Sep 2020	23(26 d)	8	28.20-28.60	380-405	98.20-98.60	212-235
Oct 2020	24(27 d)	8	28.20-28.50	230-245	98.20-98.50	176-185
Nov 2020	20(23 d)	8	0.00-28.50	230-245	98.20-98.50	0.00-184
Dec 2020	20(26 d)	8	28.30-28.60	183-196	98.10-98.50	138-145
Jan 2021	24(24 d)	8	28.30-28.50	180-192	98.10-98.40	140-146
Feb 2021	24(24 d)	8	28.10-28.60	176-209	98.10-98.50	137-170
Mar 2021	24(27 d)	8	28.10-28.60	80-186	98.10-98.50	44-117
SVE SYSTEM – 2						
Feb 2020	3(18 d)	1	0.00-290	0.00-379.66	0.00-340	0.00-390
Jun 2020	12(18 d)	1	105-165	320-435	190-250	196-298
July 2020	10(27 d)	1	0.00-165	0.00-428	0.00-235	0.00-272
Aug 2020	12(26 d)	1	140-160	340-412	210-225	222-258

Sep 2020	11(26 d)	5	140-155	0.00-399	210-399	220-235
Oct 2020	11(27 d)	5	140-155	205-225	210-230	285-315
Nov 2020	11(23 d)	5	0.00-155	0.00-212	230-230	0.00-315
Dec 2020	12(26 d)	5	140-155	172-205	225.15-231.30	275-315
Jan 2021	12(24 d)	5	140-155	180-195	210-225	278-293
Feb 2021	12(24 d)	5	140-155	180-215	210-225	278-295
Mar 2021	11(27 d)	5	140-155	115-189	210-225	203-290

The monthly performance data of SVE 1 system submitted by M/s BPCL

Date	Cumulative Time Elapsed in hr	SVE System flow rate in CFM	Influent concentration in mg/m ³			Effluent concentrations in mg/m ³			Destruction Efficiency in %	Mass Extraction rate	Cumulative Mass Extracted
			DRO	GRO	TPH	DRO	GRO	TPH		GRO in kg/hr	GRO in kg
20.05.16	13.2	91	814.64	<2.5	23038.24	186.012	<2.5	4607.65	77	0.13	1.66
25.05.16	49.2	84	22215.33	<2.5	72.855	0.123			100		
04.06.16*	126	94	1.23	0.037	<1.0	0.322	<2.5	<1.0	74		
06.06.16	150.3	79	0.617	NA	NA	0.0417	NA	NA	93		
16.06.16	271.5	92	NA	NA	NA	NA	NA	NA	99		
18.07.16	704.8	80	3462.4	1075.8	3462.4	829.2	0	829.2	76	0.47	
30.07.16	842.7	96									198.40
31.08.16	1267.75	94.58	715.5	1185.33	715.5	BDL	BDL	BDL	100	0.12	295.87
26.09.16	1591.05	96.23	BDL	1258	BDL	BDL	BDL	BDL	100	0.21	381.14
24.10.16	1991.05	96.24	0	5701.3	0	0	0	0	100	0.93	553.49
28.11.16	2439.05	95.71	0	9880	0	0	0	0	100	1.61	1273.26
27.12.16	2743.05	96.71	0	13027.2	0	0	0	0	100	2.14	1923.98
28.01.17	3195.35	97.77	0	16660	0	0	0	0	100	2.77	3175.69
24.02.17	3531.35	97.85	0	11710.4	0	0	0	0	100	1.95	3829.83
30.03.17	4004.35	97.45	0	6319.57	0	0	0	0	100	1.05	4324.75
29.04.17	4484.35	97.64	BDL	16939.00	BDL	BDL	BDL	BDL	100	2.81	5673.57
30.05.17	4980.35	98.00	BDL	2102.01	BDL	BDL	BDL	BDL	100	0.35	5847.16
28.06.17	5444.35	98.00	BDL	7236.00	BDL	BDL	BDL	BDL	100	1.20	6406.20
25.07.17	5876.35	98.00	BDL	7870.11	BDL	BDL	BDL	BDL	100	1.31	6972.30
28.08.17	6414.35	99.00	BDL	6330.14	BDL	BDL	BDL	BDL	100	1.06	7545.13
27.09.17	6942.35	98.29	BDL	5443.83	BDL	BDL	BDL	BDL	100	0.91	8025.14
27.10.17	7662.35	98.51	BDL	5589.40	BDL	BDL	BDL	BDL	100	0.94	8698.75

27.11.17	8158.35	98.33	BDL	3490.21	BDL	BDL	BDL	BDL	100	0.58	8987.97
27.12.17	8785.35	97.90	BDL	4822.86	BDL	BDL	BDL	BDL	100	0.80	9490.95
31.01.18	9511.35	97.40	BDL	3765.70	BDL	BDL	BDL	BDL	100	0.62	9943.37
28.02.18	10015.35	97.40	BDL	1389.70	BDL	BDL	BDL	BDL	100	0.23	10059.27
27.03.18	10653.35	97.40	BDL	127.60	BDL	BDL	BDL	BDL	100	0.02	10072.75
27.04.18	11384.35	97.60	BDL	334.92	BDL	BDL	BDL	BDL	100	0.05	10109.30
30.05.18	12163.35	97.60	BDL	1223.51	BDL	BDL	BDL	BDL	100	0.20	10265.10
28.06.18	12844.35	97.80	BDL	654.75	BDL	BDL	BDL	BDL	100	0.11	10339.19
31.07.18	13625.35	97.90	BDL	2257.00	BDL	BDL	BDL	BDL	100	0.38	10635.97
29.08.18	14307.35	97.52	BDL	1980.67	BDL	BDL	BDL	BDL	100	0.33	10861.03
15.09.18	14715.35	97.61	BDL	1837.67	BDL	BDL	BDL	BDL	100	0.31	10987.51
30.11.18	15555.35	97.49	BDL	2036.34	BDL	BDL	BDL	BDL	100	0.34	11273.11
31.12.18	16299.35	97.10	BDL	1547.33	BDL	BDL	BDL	BDL	100	0.26	11466.55
31.01.19	17043.35	97.58	BDL	2354.00	BDL	BDL	BDL	BDL	100	0.39	11756.71
28.02.19	17715.35	98.18	BDL	760.00	BDL	BDL	BDL	BDL	100	0.13	11844.07
31.03.19	18459.35	97.77	BDL	1303.33	BDL	BDL	BDL	BDL	100	0.22	12007.75
30.04.19	19179.35	97.83	BDL	890.00	BDL	BDL	BDL	BDL	100	0.15	12115.75
31.05.19	19923.35	97.55	BDL	656.75	BDL	BDL	BDL	BDL	100	0.11	12197.59
30.06.19	20643.35	98.13	BDL	1848.25	BDL	BDL	BDL	BDL	100	0.31	12420.79
31.07.19	21382.35	97.94	BDL	1213.00	BDL	BDL	BDL	BDL	100	0.20	12570.07
31.08.19	22038.35	97.82	BDL	986.25	BDL	BDL	BDL	BDL	100	0.16	12677.61
30.09.19	22730.35	98.40	BDL	1296.00	BDL	BDL	BDL	BDL	100	0.22	12827.57
31.10.19	23457.35	97.58	BDL	1459.72	BDL	BDL	BDL	BDL	100	0.24	13003.50
30.11.19	24170.35	97.73	BDL	2045.14	BDL	BDL	BDL	BDL	100	0.34	13245.92
30.12.19	24908.35	98.29	BDL	1226.80	BDL	BDL	BDL	BDL	100	0.20	13396.52
31.01.20	25573.35	98.16	BDL	270.51	BDL	BDL	BDL	BDL	100	0.05	13429.77
29.02.20	26229.35	98.02	BDL	528.00	BDL	BDL	BDL	BDL	100	0.08	13487.54
31.03.20	26779.35	98.30	BDL	1384.96	BDL	BDL	BDL	BDL	100	0.20	13597.54
30.04.20	26853.35	98.30	BDL	1384.96	BDL	BDL	BDL	BDL	100	0.20	13613.94
31.05.20	27069.35	98.30	BDL	1384.96	BDL	BDL	BDL	BDL	100	0.20	13655.54
30.06.20	27622.35	98.36	BDL	342.00	BDL	BDL	BDL	BDL	100	0.06	13687.54
31.07.20	28259.35	98.37	BDL	160.16	BDL	BDL	BDL	BDL	100	0.03	13704.62

31.08.20	28838.00	98.40	BDL	3038.00	BDL	BDL	366.29	BDL	87.9	0.51	13998.56
30.09.20	29465.00	98.38	BDL	3320.33	BDL	BDL	BDL	BDL	100	0.56	14346.58
31.10.20	30107.00	98.35	BDL	1859.90	BDL	BDL	BDL	BDL	100	0.31	14546.13
30.12.20	30508.00	98.41	BDL	1442.96	BDL	BDL	BDL	BDL	100	0.24	14642.89
31.12.20	31101.00	98.33	BDL	1550.57	BDL	BDL	14.89	BDL	99.0	0.26	14796.52
30.01.21	31671.00	98.29	BDL	716.06	BDL	BDL	BDL	BDL	100	0.12	14864.69
27.02.21	32238.00	98.33	BDL	1209.83	BDL	BDL	BDL	BDL	100	0.20	14979.31
31.03.21	32876.00	98.39	BDL	133.20	BDL	BDL	BDL	BDL	100	0.02	14993.51
31.05.21	33954.00	98.39	BDL	195.56	BDL	BDL	BDL	BDL	100	0.03	15028.76
30.06.21	34311.00	98.39	BDL	490.72	BDL	BDL	BDL	BDL	100	0.08	15058.05

The monthly performance data of SVE 2 system submitted by M/s BPCL

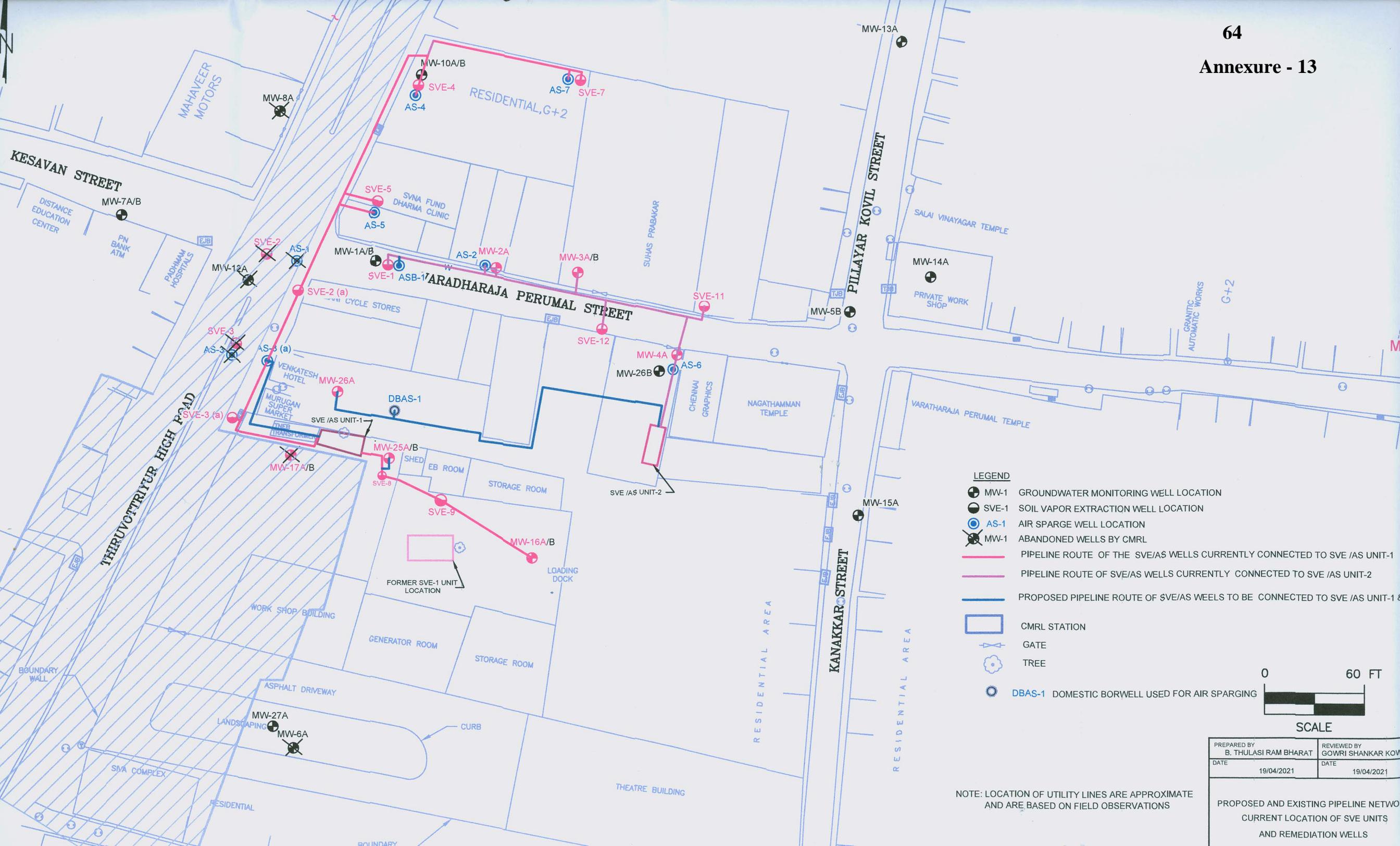
Date	Operational hours	Flow Rate	Influent Concentrations			Effluent Concentrations			Destruction Efficiency	Mass Extraction Rate	Mass Extracted	Cumulative Mass Extracted
			DRO	GRO	TPH	DRO	GRO	TPH				
	Hours	CFM	mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³	mg/m ³	%	Kgs/hr	Kgs/month	Kilograms
29.02.20	82.00	258.30	BDL	1061.60	BDL	BDL	BDL	BDL	100	0.50	41.00	28.87
30.06.20	293.00	220.56	BDL	1737.30	BDL	BDL	BDL	BDL	100	0.65	137.15	166.37
31.07.20	576.00	205.00	BDL	7114.87	BDL	BDL	826.88	BDL	88	2.48	701.84	876.07
31.08.20	880.00	219.00	BDL	2371.60	BDL	BDL	438.77	BDL	81	0.88	268.30	1135.37
30.09.20	1176.00	223.80	BDL	2348.38	BDL	BDL	BDL	BDL	100	0.89	264.35	1399.71
31.10.20	1478.00	218.89	BDL	894.30	BDL	BDL	14.77	BDL	98	0.33	100.45	1500.17
30.11.20	1695.00	228.16	BDL	885.95	BDL	BDL	12.47	BDL	99	0.34	74.54	1574.70

31.12.20	1995.00	217.50	BDL	475.54	BDL	BDL	4.84	BDL	99	0.18	52.73	1627.43
30.01.21	2278.00	218.96	BDL	518.56	BDL	BDL	BDL	BDL	100	0.19	54.60	1682.03
27.02.21	2555.00	219.17	BDL	758.47	BDL	BDL	BDL	BDL	100	0.28	78.24	1760.27
31.03.21	2864.00	218.70	BDL	629.65	BDL	BDL	BDL	BDL	100	0.23	72.30	1832.58
31.06.21	3395.00	218.89	BDL	22.74	BDL	BDL	BDL	BDL	100	0.01	4.49	1837.07
30.06.21	3581.00	217.81	BDL	739.00	BDL	BDL	BDL	BDL	100	0.27	50.87	1887.94

Note: BDL - Below detectable limit

*SVE was under repair, Carbon adsorption system was in operation

NA- Lab analysis reports are not available



LEGEND

- MW-1 GROUNDWATER MONITORING WELL LOCATION
- SVE-1 SOIL VAPOR EXTRACTION WELL LOCATION
- AS-1 AIR SPARGE WELL LOCATION
- MW-1 ABANDONED WELLS BY CMRL
- PIPELINE ROUTE OF THE SVE/AS WELLS CURRENTLY CONNECTED TO SVE /AS UNIT-1
- PIPELINE ROUTE OF SVE/AS WELLS CURRENTLY CONNECTED TO SVE /AS UNIT-2
- PROPOSED PIPELINE ROUTE OF SVE/AS WELLS TO BE CONNECTED TO SVE /AS UNIT-1
- CMRL STATION
- GATE
- TREE
- DBAS-1 DOMESTIC BORWELL USED FOR AIR SPARGING



PREPARED BY B. THULASI RAM BHARAT	REVIEWED BY GOWRI SHANKAR K
DATE 19/04/2021	DATE 19/04/2021

NOTE: LOCATION OF UTILITY LINES ARE APPROXIMATE AND ARE BASED ON FIELD OBSERVATIONS

PROPOSED AND EXISTING PIPELINE NETWORK
CURRENT LOCATION OF SVE UNITS
AND REMEDIATION WELLS

LEGEND

- ⊕ MW-1A/B MONITORING WELL LOCATION
- ⊖ SVE-1 SOIL VAPOR EXTRACTION WELL LOCATION
- ⊙ AS-2 AIR SPARGE WELL LOCATION
- ⊕ MW-6A ABANDONED MONITORING WELL LOCATION
- ⊖ SVE-2 ABANDONED SOIL VAPOR EXTRACTION WELL LOCATION
- ⊙ AS-1 ABANDONED AIR SPARGE WELL LOCATION
- ⊕ MW-25A/B MONITORING WELL LOCATION INSTALLED II
- ⊙ B-2 SOIL BORINGS LOCATION DRILLED IN 2021



8	Mineral oil (mg/L)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)	BDL (DL: 0.1)
9	BTEX (mg/L)	0.05	0.05	BLQ (LOQ: 0.02)	0.08	0.11	BLQ (LOQ: 0.02)	0.07	BLQ (LOQ: 0.02)	BLQ (LOQ: 0.02)	BLQ (LOQ: 0.02)	BLQ (LOQ: 0.02)	BLQ (LOQ: 0.02)	BLQ (LOQ: 0.02)	BDL (DL: 0.02)	0.071

Groundwater samples carried out from Monitoring Wells on August 06, 2020

S.No	Parameter & Units	Deep wells monitoring and Detectable limits						
		MW – 25 B	MW – 16 B	MW – 3 B	MW – 5 B	MW – 23 B	MW- 7 B	MW – 26 B
1	TPH (mg/L)	BLQ (LOQ:0.05)	BLQ (LOQ:0.05)	0.35	0.99	BLQ (LOQ:0.05)	0.44	0.79
2	VOC (mg/L)	BLQ (LOQ:0.02)	BLQ (LOQ:0.02)	0.33	BLQ (LOQ:0.02)	BLQ (LOQ:0.02)	0.32	BLQ (LOQ:0.02)
3	DRO (mg/L)	BLQ (LOQ:0.05)	BLQ (LOQ:0.05)	0.35	0.77	BLQ (LOQ:0.05)	0.44	0.79
4	GRO (mg/L)	BLQ (LOQ:0.02)	BLQ (LOQ:0.02)	0.14	BLQ (LOQ:0.02)	BLQ (LOQ:0.02)	0.13	BLQ (LOQ:0.02)

5	Total Hydrocarbon (mg/L)	BLQ (LOQ:0.05)	BLQ (LOQ:0.05)	0.35	0.99	BLQ (LOQ:0.05)	0.44	0.79
6	TOC (mg/L)	518	2	3.1	BDL (DL:4.0)	31	16	BDL (DL:2.0)
7	Oil & Grease (mg/L)	BDL (DL:4.0)	BDL (DL:4.0)	BDL (DL:4.0)	BDL (DL:4.0)	BDL (DL:4.0)	BDL (DL:4.0)	BDL (DL:4.0)
8	Mineral oil (mg/L)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)	BDL (DL:0.1)
9	BTEX (mg/L)	BLQ (LOQ:0.02)	BLQ (LOQ:0.02)	0.09	BLQ (LOQ:0.02)	BLQ (LOQ:0.02)	0.067	BLQ (LOQ:0.02)

Note:

BDL – Below detectable limit, DC – Detectable limit

BLQ – Below limit of quantification

LOQ – Limit of quantification